CRITICAL STABILITY CONSTANTS

Volume 4: Inorganic Complexes

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Volume 1 • Amino Acids
Volume 2 • Amines
Volume 3 • Other Organic Ligands
Volume 4 • Inorganic Complexes

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Volume 4: Inorganic Complexes

by Robert M. Smith and Arthur E. Martell

Department of Chemistry
College of Science
Texas A & M University
College Station, Texas

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PREFACE

Over the past fifteen years the Commission on Equilibrium Data of the Analytical Division of the International Union of Pure and Applied Chemistry has been sponsoring a noncritical compilation of metal complex formation constants and related equilibrium constants. This work was extensive in scope and resulted in the publication of two large volumes of *Stability Constants* by the Chemical Society (London). The first volume, edited by L. G. Sillen (for inorganic ligands) and by A. E. Martell (for organic ligands), was published in 1964 and covered the literature through 1962. The second volume, subtitled Supplement No. 1, edited by L. G. Sillen and E. Hogfeldt (for inorganic ligands) and by A. E. Martell and R. M. Smith (for organic ligands), was published in 1971 and covered the literature up to 1969. These two large compilations attempted to cover all papers in the field related to metal complex equilibria (heats, entropies, and free energies). Since it was the policy of the Commission during that period to avoid decisions concerning the quality and reliability of the published work, the compilation would frequently contain from ten to twenty values for a single equilibrium constant. In many cases the values would differ by one or even two orders of magnitude, thus frustrating readers who wanted to use the data without doing the extensive literature study necessary to determine the correct value of the constant in question.

Because of difficulties of this nature, and because of the general lack of usefulness of a noncritical compilation for teaching purposes and for scientists who are not sufficiently expert in the field of equilibrium to carry out their own evaluation, we have decided to concentrate our efforts in this area toward the development of a critical and unique compilation of metal complex equilibrium constants. Although it would seem that decisions between available sets of data must sometimes be arbitrary and therefore possibly unfair, we have found the application of reasonable guidelines leads directly to the elimination of a considerable fraction of the published data of doubtful value. Additional criteria and procedures that were worked out to handle the remaining literature are described in the *Introduction* of this book. Many of these methods are quite similar to those used in other compilations of critical data.

In cases where a considerable amount of material has accumulated, it is felt that most of our critical constants will stand the test of time. Many of the data listed, however, are based on only one or a very few literature references and are subject to change when better data come along. It should be fully understood that this compilation is a continually changing and growing body of data, and will be revised from time to time as new results of these systems appear in the literature.

The scope of these tables includes the heats, entropies, and free energies of all reactions involving organic and inorganic ligands. The magnitude of the work is such that far more than a thousand book pages will be required. In order that the material be available in convenient form, the amino acid complexes are presented in Volume 1 and amine complexes (which do not contain carboxylic acid functions) are included in Volume 2. The remaining organic complexes are the subject of Volume 3. Volume 4 comprises the inorganic complexes.

We are grateful to Sten Ahrland, Charles F. Baes, Jr., Gregory R. Choppin, George H. Nancollas, and Reino Näsänen for reviewing portions of the manuscript and making valuable comments. We are also indebted to Charles F. Baes, Jr. for a prepublication copy of his book on the hydrolysis of cations (76BM).

Texas A&M University
College Station, Texas

Robert M. Smith
Arthur E. Martell

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INTRODUCTION

Purpose

This compilation of metal complex equilibrium (formation) constants and the corresponding enthalpy and entropy values represent the authors' selection of the most reliable values among those available in the literature. In many cases wide variations in published constants for the same metal complex equilibrium indicate the presence of one or more errors in ligand purity, in the experimental measurements, or in calculations. Usually, the nature of these errors is not readily apparent in the publication, and the reader is frequently faced with uncertainties concerning the correct values. In the course of developing noncritical compilations of stability constants, the authors have long felt that these wide variations in published work constitute a serious impediment to the use of equilibrium data. Thus these critical tables were developed in order to satisfy what is believed to be an important need in the field of coordination chemistry.

Scope

These tables include all organic and inorganic ligands for which reliable values have been reported in the literature. The present volume is restricted to inorganic ligands.

Values determined in nonaqueous solutions as well as values involving two or more different ligands (i.e., "mixed ligand" complexes) have not been included in this compilation but may be included in a subsequent volume. Mixed ligand complexes containing hydrogen or hydroxide ions are included since these ions are derived from the solvent and are therefore potentially always available. In general, data were compiled for only those systems that involve metal ion equilibria. Data on potentially important ligands for which only acid–base equilibria are presently available are given in a separate table.

Selection Criteria

When several workers are in close agreement on a particular value, the average of their results has been selected for that value. Values showing considerable scatter have been eliminated. In cases where the agreement is poor and few results are available for comparison, more subtle methods were needed to select the best value. This selection was often guided by a comparison with values obtained for other metal ions with the same ligand and with values obtained for the same metal ion with similar ligands.

While established trends among similar metal ions and among similar ligands were valuable in deciding between widely varying values, such guidelines were used cautiously, so as not to overlook occasionally unexpected real examples of specificity or anomalous behavior.

When there was poor agreement between published values and comparison with other metal ions and ligands did not suggest the best value, the results of more experienced research groups who had supplied reliable values for other ligands were selected. When such assurances were lacking, it was sometimes

possible to give preference to values reported by an investigator who had published other demonstrably reliable values obtained by the same experimental method.

In some cases the constants reported by several workers for a given group of metal ions would have similar relative values, but would differ considerably in the absolute magnitudes of the constants. Then a set of values from one worker near the median of all values reported were selected as the best constants. By this method it is believed that internal consistency was preserved to a greater extent than would be obtained by averaging reported values for each individual metal ion. When an important constant was missing from the selected set of values, but was available in another set of values not selected for this compilation, the missing constant was obtained by adjusting the nonselected values by a common factor, which was set so as to give the best agreement between the two groups of data.

Values reported by only one investigator are included in these tables unless there was some reason to doubt their validity. It is recognized that some of these values may be in error, and that such errors will probably not be detected until the work is repeated by other investigators, or until more data become available for analogous ligands or other closely related metal ions. Some values involving unusual metal ions have been omitted because of serious questions about the form of their complexes.

Papers deficient in specifying essential reaction conditions (e.g., temperature, ionic strength, nature of supporting electrolyte) were not employed in this compilation. Also used as a basis for disqualification of published data is lack of information on the purity of the ligand. Frequent deficiencies are lack of calibration of potentiometric apparatus, and failure to define the equilibrium quotients reported in the paper. Papers in which both temperature and ionic strength are not controlled have been omitted from the bibliography.

A bibliography for each ligand is included so that the reader may determine the completeness of the literature search employed in the determination of critical values. The reader may also employ these references to make his own evaluation if he has any questions or reservations concerning this compilation.

Arrangement

The arrangement of the tables is based on the periodic table position of the central atom of the ligand except that the hydroxide ion is placed first because of its importance in considering equilibria involving other ligands. This is followed by transition metal ligands and then those of groups III through VII of the periodic table. Within each group of tables involving the same atom, the arrangement is from the lowest oxidation state to higher ones. Next there is a table of protonation constants for ligands for which no stability constants or only questionable metal stability constants are reported. Finally, there is a list of other ligands considered but not included in the tables for various reasons.

Metal Ions

The metal ions within each table are arranged in the following order: hydrogen, alkali metals, alkaline earth metals, lanthanides (including Sc and Y), actinides, transition metals, and posttransition metals. Within each group the arrangement is by increasing oxidation state of the metal, and within each oxidation state the arrangement follows the periodic table from top to bottom and from left to right. An exception is that Cu^{+}, Ag^{+}, Pd^{2+}, and Pt^{2+} are included with the posttransition metals.

Equilibrium

An abbreviated equilibrium quotient expression in the order products/ reactants is included for each constant, and periods are used to separate distinct entities. Charges have been omitted as these can be determined from the charge of the metal ion and the abbreviated ligand formulas (such as HL) given

after the name. Water has not been included in the equilibrium expressions since all of the values cited are for aqueous solutions. For example, $M_4L_4/M^4 \cdot L^4$ for Mg^{2+} and hydroxide ion would represent the equilibrium: $4Mg^{2+} + 4OH^- \rightleftharpoons Mg_4(OH)_4^{4+}$. The symbol M represents the metal ion given in the first column and may include more than one atom as in the case of Hg_2^{2+}. The symbol H_{-1} (H_{-2}, etc.) is used for the ionization of a proton from the ligand alone at high pH.

Equilibria involving protons are written as stability constants (protonation constants) rather than as ionization constants to be consistent with the metal complex formation constants. Consequently the $\triangle H$ and $\triangle S$ values have signs opposite to those describing ionization constants.

Solids and gases are identified by (s) and (g) respectively and are included for identification purposes even though they are not involved in the equilibrium quotient.

Log *K* Values

The log *K* values are the logarithms of the equilibrium quotients given in the second column at the specified conditions of temperature and ionic strength. The selected values are those considered to be the most reliable of the ones available. In some cases the value is the median of several values and in other cases it is the average of two or more values. The range of other values considered reliable is indicated by + or − quantities describing the algebraic difference between the other values and the selected value. The symbol ±0.00 indicates that there are one or more values which agree exactly with the stated value to the number of significant figures given. Values considered to be of questionable validity are enclosed in parentheses. Such values are included when the evidence available is not strong enough to exclude them on the basis of the above criteria. Values concerning which there is consierable doubt have been omitted.

The log *K* values are given for the more commonly reported ionic strengths. The ionic strengths most used for inorganic ligands are 0.1, 0.5, 1.0, 2.0, 3.0, 4.0, and 0. Zero ionic strength is perhaps more important from a theoretical point of view, but several assumptions are involved in extrapolating or calculating from the measured values. The Davies equation is often used to calculate constants to zero from low-ionic-strength measurements. It was established from results obtained with monovalent and divalent ions and its extension to trivalent ions is extremely questionable.

The temperature of 25°C was given preference in the tables because of its widespread use in equilibrium measurements and reporting other physical properties. When available, enthalphy changes ($\triangle H$) were used to calculate log *K* at 25°C when only measurements at other temperatures were available.

Other temperatures frequently employed are 20°C, 30°C, and 37°C. These are not included in the tables when there is a lack of column space and $\triangle H$ is available, since they may be calculated using the $\triangle H$ value. Values at other temperatures, especially those at 20°C and 30°C, were converted to 25°C to facilitate quantitative comparisons with the 25°C values listed.

Equilibria involving protons have been expressed as concentration constants in order to be more consistent with the metal ion stability constants which involve only concentration terms. Concentration constants may be determined by calibrating the electrodes with solutions of known hydrogen ion concentrations or by conversion of pH values using the appropriate hydrogen ion activity coefficient. When standard buffers are used, mixed constants (also known as Bronsted or practical constants) are obtained which include both activity and concentration terms. Literature values expressed as mixed constants have been converted to concentration constants by using the hydrogen ion activity coefficients determined in KCl solution before inclusion in the tables. In some cases, papers were omitted because no indication was given as to the use of concentration or mixed constants. Some papers were

retained despite this lack of information when it could be ascertained which constant was used by comparing to known values or by personal communication with the authors. For those desiring to convert the listed protonation constants to mixed constants, the following values should be added to the listed values at the appropriate ionic strength (the tabulation applies only to single proton association constants):

Ionic strength	Increase in log K
0.05	0.09
0.10	0.11
0.15	0.12
0.2	0.13
0.5	0.15
1.0	0.14
2.0	0.11
3.0	0.07

The values in the tables have not been corrected for complexation with medium ions for the most part. There are insufficient data to make corrections for most of the ligands, and in order to make values between ligands more comparable, the correction has not been made in the few cases where it could be made. In general the listed formation constants at constant ionic strength include competition by ions from KNO_3 and $NaClO_4$ and are somewhat smaller than they would be if measured in solutions of tetraalkylammonium salts.

Limited comparisons were made between values at different ionic strengths using observed trends. With inorganic ligands the stability constants usually decrease with ionic strength until a minimum is reached and then increase with increasing ionic strength. The minimum is often at about 0.5 ionic strength when hydrogen or hydroxide ion is involved but may change with other ions. With basic ligands such as ammonia there is a continuing increase with ionic strength and no maximum or minimum is generally observed. With phosphorous compounds containing oxygen donors there is a continuing decrease with ionic strength because of the increased competition from sodium ions in the background electrolyte.

The solubility products of precipitates frequently become more negative with longer digestive times. This is apparently due to conversion to less soluble forms of the precipitate with time. Since various digestive times have been used to measure solubility products, their comparison becomes rather tenuous, except for rough approximations. With lanthanide hydroxides, the solubility products have been measured as a function of time at constant temperature in some cases, and the values listed in the table have been corrected to the fresh or active precipitate by using the average change with time of the lanthanide hydroxides as a whole.

The hydrolysis of highly charged metal ions, such as Th^{4+}, apparently leads to different polymerization products in different media. Consequently the species formed may be different with a change in the background electrolyte if the background electrolyte becomes part of the polymeric ions.

Enthalpy Values

The enthalpy of complexation values ($\triangle H$) listed in the tables have the units kcal/mole because of the widespread use of these units by workers in the field. These may be converted to SI units of kj/mole by multiplying the listed values by 4.184.

Calorimetrically determined values and temperature-variation-determined values from cells without liquid junction were considered of equal validity for the tables. Other temperature-variation-determined values were rounded off to the nearest kcal/mole and were enclosed in parentheses because of their reduced accuracy. Other values considered to be reliable but differing from the listed value were

indicated by + or − quantities describing the algebraic difference between the other value and the selected value.

The magnitude of $\triangle H$ may vary with temperature and ionic strength, but usually this is less than the variation between different workers and little attempt has been made to show $\triangle H$ variation with changing conditions except for certain carefully measured equilibria such as the protonation of hydroxide ion and of ammonia. These $\triangle H$ values may be used for estimating log K values at temperatures other than those listed, using the relationship

$$\frac{\triangle H}{2.303RT^2} = \frac{d \log K}{dT}$$

or, at 25°C,

$$\log K_2 = \log K_1 + \triangle H(T_2 - T_1)(0.00246).$$

This assumes that $\triangle C_p = 0$, which is not necessarily the case. The greater the temperature range employed, the greater the uncertainty of the calculated values.

Entropy Values

The entropy of complexation values ($\triangle S$) listed in the tables have the units cal/mole/degree and have been calculated from the listed log K and $\triangle H$ values, using the expression

$$\triangle G = \triangle H - T\triangle S$$

or, at 25°C,

$$\triangle S = 3.36\ (1.363 \log K + \triangle H).$$

These entropy values have been rounded off to the nearest cal/mole/degree, except in cases where $\triangle H$ values were quite accurate.

Bibliography

The references considered in preparing each table are given at the end of the table. The more reliable references are listed after the ions for which values are reported. In some tables groups of similar metal ions have been grouped together for the bibliography. The term "Other references" is used for those reporting questionable values, or values at conditions considerably different from those used in the tables, or values for metal ions not included in the tables because of questionable knowledge about the forms of their complexes. These additional references are cited to inform the reader of the extent of the literature search made in arriving at the selected values.

The bibliographical symbols used represent the year of the reference and the first letter of the surnames of the first two listed authors. In cases of duplication, letters a, b, c, etc., or the first letter of the third author's name are employed. The complete reference is given in the bibliography at the end of each volume.

In a work of this magnitude, there will certainly be errors and a few pertinent publications will have been overlooked by the compilers. We should like to request those who believe they have detected errors in the selection process, know of publications that were omitted, or have any suggestions for improvement of the tables, write to:

A. E. Martell, Head
Department of Chemistry
Texas A&M University
College Station, Texas 77843, U.S.A.

It is the intention of the authors to publish more complete and accurate revisions of these tables as demanded by the continually growing body of equilibrium data in the literature.

OH^-

HO^- Hydroxide ion L^-

Metal ion	Equilibrium	Log K 25°, 0.5	Log K 25°, 1.0	Log K 25°, 0	ΔH 25°, 0	ΔS 25°, 0
H^+	HL/H.L	13.74 ±0.02	13.79 ±0.02	13.997±0.003	-13.34 ±0.01	19.3
		13.78[a]±0.01	14.18[e]±0.04		-13.55[b]±0.05	17.7[b]
		13.95[h]			-13.08[e]±0.03	21.0[e]
		13.96[d]±0.01			-12.69[p]	
Li^+	ML/M.L		-0.18[e]	0.36	(0)[r]	(2)
Na^+	ML/M.L			-0.2	(0)[s]	(-1)
K^+	ML/M.L			-0.5		
Be^{2+}	ML/M.L	8.3[h]		8.6		
	$ML_2/M.L^2$	(16.5)	(17.5)[e]	(14.4)		
		(16.7)[h]				
	$ML_3/M.L^3$			18.8		
	$ML_4/M.L^4$			18.6		
	$M_2L/M^2.L$	10.54	10.95[e]	(10.0)	-8.9[e]	20[e]
		10.68[d]				
	$M_3L_3/M^3.L^3$	32.41	33.88[e]	33.1	-24.8[e]	72[e]
		32.98[d]				
	$M_6L_8/M^6.L^8$			(85)	(-58)[t]	(200)
	$M.L^2/ML_2$(s, amorphous)			-21.0		
	$M.L^2/ML_2$(s,α)			-21.31		
	$M.L^2/ML_2$(s,β)			-21.7		
Mg^{2+}	ML/M.L		1.85[e]	2.58 ±0.0		
	$M_4L_4/M^4.L^4$		16.93[e]	16.3		
	$M.L^2/ML_2$(s)			-11.15 ±0.2		
Ca^{2+}	ML/M.L		0.64[e]	1.3 ±0.1	2.0	13
	$M.L^2/ML_2$(s)			-5.19 ±0.2	-4.3	-38
Sr^{2+}	ML/M.L		0.23[e]	0.8 ±0.1	1.2	8

[a] 25°, 0.1; [b] 25°, 0.5; [d] 25°, 2.0; [e] 25°, 3.0; [h] 20°, 0.1; [p] 40°, 0; [r] 15-35°, 0; [s] 0-50°, 0; [t] 0-60°, 1.0 molal

Hydroxide ion (continued)

Metal ion	Equilibrium	Log K 25°, 0.5	Log K 25°, 1.0	Log K 25°, 0	ΔH 25°, 0	ΔS 25°, 0
Ba^{2+}	$ML/M.L$	0.4[a]	0.00[e]	0.6 ±0.1	1.1 ±0.1	9
	$M.L^2/ML_2(H_2O)_8(s)$			−3.6	13.7	29
Sc^{3+}	$ML/M.L$	9.06	8.63 ±0.02	9.7	(2)[t]	(50)[c]
		9.31[a]±0.00				
		9.1[h]				
	$ML_2/M.L^2$	17.4[h]	17.4	18.3		
	$ML_3/M.L^3$	24.9[h]		25.9		
	$ML_4/M.L^4$			30		
	$M_2L_2/M^2.L^2$	21.50	21.49 ±0.03	22.0	(−12)[t]	(60)[c]
		21.53[a]				
	$M_3L_5/M^3.L^5$	51.69	51.55 ±0.07	53.8	(−28)[t]	(150)[c]
		51.88[a]				
	$M.L^3/MOL(s)$		-30.9	-32.7		
Y^{3+}	$ML/M.L$	5.39[u]	5.1[e]	6.3		
	$M_2L_2/M^2.L^2$		14.06[e]	13.8		
	$M_3L_5/M^3.L^5$		37.1[e]	38.4		
	$M.L^3/ML_3(s)$			-23.2		
La^{3+}	$ML/M.L$	4.67[u]	4.1[e]	5.5		
	$M_2L/M^2.L$		(4.2)[e]			
	$M_5L_9/M^5.L^9$		56.2[e]	54.8		
	$M.L^3/ML_3(s)$			-20.7		
Ce^{3+}	$M_3L_5/M^3.L^5$		35.1[e]	36.5		
	$M.L^3/ML_3(s)$			-21.2		
Pr^{3+}	$ML/M.L$	5.18[u]				
	$M.L^3/ML_3(s)$			-21.5		
Nd^{3+}	$ML/M.L$	5.30[u]	4.8[e]	6.0		
	$ML_4/M.L^4$			18.6		
	$M_2L_2/M^2.L^2$		14.43[e]	14.1		
	$M.L^3/ML_3(s)$			-23.1 ±0.0		
Sm^{3+}	$ML/M.L$	5.39[u]				
	$M.L^3/ML_3(s)$			-25.4		

[a] 25°, 0.1; [c] 25°, 1.0; [e] 25°, 3.0; [h] 20°, 0.1; [t] 10-40°, 1.0 molal; [u] 25°, 0.3

Hydroxide ion (continued)

Metal ion	Equilibrium	Log K 25°, 0.5	Log K 25°, 1.0	Log K 25°, 0	ΔH 25°, 0	ΔS 25°, 0
Eu^{3+}	ML/M.L	5.42[u]				
	$M.L^3/ML_3(s)$			-25.6		
Gd^{3+}	ML/M.L	5.38[u]	5.0[e]			
	$M_2L_2/M^2.L^2$		14.13[e]			
	$M.L^3/ML_3(s)$			-25.7		
Tb^{3+}	ML/M.L	5.57[u]				
	$M.L^3/ML_3(s)$			-25.5		
Dy^{3+}	ML/M.L	5.63[u]				
	$M.L^3/ML_3(s)$			-25.6		
Ho^{3+}	ML/M.L	5.69[u]				
	$M.L^3/ML_3(s)$			-25.9		
Er^{3+}	ML/M.L	5.74[u]				
	$M.L^3/ML_3(s)$			-24.9		
Tm^{3+}	ML/M.L	5.78[u]				
Yb^{3+}	ML/M.L	5.81[u]				
	$M.L^3/ML_3(s)$			-25.0		
Lu^{3+}	ML/M.L	5.83[u]				
	$M.L^3/ML_3(s)$			-26.1		
Pu^{3+}	ML/M.L	6.7[a]		7.0		
Am^{3+}	ML/M.L	7.9[a]				
Cm^{3+}	ML/M.L	7.9[a] -0.1				
Bk^{3+}	ML/M.L	8.2[a]				
Cf^{3+}	ML/M.L	8.2[a]				
Ce^{4+}	ML/M.L		13.17[k]		(-8)[z]	(30)[k]
	$M_2L_3/M^2.L^3$		40.9[e,n]			
	$M_2L_4/M^2.L^4$		54.5[e,n]			
	$M_6L_{12}/M^6.L^{12}$		168.4[e,n]			

[a] 25°, 0.1; [e] 25°, 3.0; [k] 25°, 1.5, assuming HL/H.L = 13.87; [n] $NaNO_3$ used as background electrolyte; [u] 25°, 0.3; [z] 10-25°, 1.5

Hydroxide ion (continued)

Metal ion	Equilibrium	Log K 25°, 0.5	Log K 25°, 1.0	Log K 25°, 0	ΔH 25°, 0	ΔS 25°, 0
Th^{4+}	$ML/M.L$		9.6	10.8	(-8)[t]	(20)[c]
			9.1[e,y]			
	$ML_2/M.L^2$		19.89	21.1	(-13)[t]	(50)[c]
	$M_2L_2/M^2.L^2$		22.97	(21.9)	(-12)[t]	(60)[c]
			23.58[e,y]			
	$M_2L_3/M^2.L^3$		33.8[e,y]			
	$M_2L_5/M^2.L^5$		(53.7)[e,y]			
	$M_3L/M^3.L$		(12.7)[e,y]			
	$M_3L_3/M^3.L^3$		(35.7)[e,y]			
	$M_4L_8/M^4.L^8$		91.2	(90.9)	(-51)[t]	(250)[c]
	$M_6L_{14}/M^6.L^{14}$		162.1[e,y]			
	$M_6L_{15}/M^6.L^{15}$		169.8	173.2	(-96)[t]	(470)[c]
	$M.L^4/ML_4(s)$			-44.7[o]		
	$M.L^4/MO_2(s)$			-49.7		
Pa^{4+}	$ML/M.L$		14.04[e]	14.8		
	$ML_2/M.L^2$		27.84[e]	28.0		
	$ML_3/M.L^3$		40.7[e]			
	$ML_4/M.L^4$		51.4[e]			
U^{4+}	$ML/M.L$	12.24	12.23 -0.01	13.3	(-2)[r]	(50)
		12.50[a]				
		12.31[d]±0.03	(12.1)[e]			
	$M_6L_{15}/M^6.L^{15}$		196.1[e]	192.8		
	$ML_5/M.L^5$			54.0		
	$M.L^4/MO_2(s)$			-56.2		
Np^{4+}	$ML/M.L$	11.7[d]		12.5		
Pu^{4+}	$ML/M.L$	12.14	12.1			
		12.23[d]			(-6)[w]	(40)[d]
	$M.L^4/ML_4(s)$			-47.3		

[a] 25°, 0.1; [c] 25°, 1.0; [d] 25°, 2.0; [e] 25°, 3.0; [o] 22°, 0; [r] 10-43°, 0; [t] 0-95°, 1.0 molal; [w] 15-25°, 2.0; [y] NaCl used as background electrolyte.

Hydroxide ion (continued)

Metal ion	Equilibrium	Log K 25°, 0.5	Log K 25°, 1.0	Log K 25°, 0	ΔH 25°, 0	ΔS 25°, 0
Pa(V)	$ML_4/ML_3.L$		13.13[e]	14.5		
	$ML_5/ML_4.L$		9.68[e]	9.5		
UO_2^{2+}	ML/M.L	8.0 ±0.0	8.1[e]	8.2	(-2)[x]	(30)[b]
		(7.7)[a]				
	$M_2L/M^2.L$		9.6			
	$M_2L_2/M^2.L^2$	21.55 ±0.02	21.64 ±0.02	22.4		
		21.73[a]	22.32[e]		16.7[e]	46[e]
	$M_3L_4/M^3.L^4$		42.4			
			43.5[e]			
	$M_3L_5/M^3.L^5$	52.4 ±0.1	52.6 ±0.1	54.4		
			54.4[e]		41.1[e]	111[e]
	$M.L^2/ML_2(s)$			-22.4		
NpO_2^{2+}	ML/M.L		8.6	8.9		
	$M_2L_2/M^2.L^2$		20.9	21.6		
	$M_3L_5/M^3.L^5$		50.7	52.5		
PuO_2^{2+}	ML/M.L		7.8	8.4		
			7.9[e]			
	$M_2L_2/M^2.L^2$		19.1	19.6		
			20.1[e]			
	$M_3L_5/M^3.L^5$		46.8	48.4		
			49.3[e]			
Mn^{2+}	ML/M.L	2.9[a] +0.1	3.0	3.4	(0)[r]	(20)
		3.5[d]				
	$ML_4/M.L^4$			7.7		
	$M_2L/M^2.L$	4.1[d]		(3.4)		
	$M_2L_3/M^2.L^3$	16.4[d]		18.1		
	$M.L^2/ML_2(s)$			-12.8 +0.1		
Fe^{2+}	ML/M.L		4.3	4.5		
	$ML_2/M.L^2$			(7.4)		
	$ML_3/M.L^3$			10.0		
	$ML_4/M.L^4$			9.6		
	$M.L^2/ML_2(s)$			-15.1		

[a] 25°, 0.1; [b] 25°, 0.5; [d] 25°, 2.0; [e] 25°, 3.0; [r] 15-42°, 0; [x] 25-95°, 0.5

Hydroxide ion (continued)

Metal ion	Equilibrium	Log K 25°, 0.5	Log K 25°, 1.0	Log K 25°, 0	ΔH 25°, 0	ΔS 25°, 0
Co^{2+}	ML/M.L	(3.9)	(3.9)	4.3		
			4.2[e]			
	$ML_2/M.L^2$		8.5	8.4		
	$ML_3/M.L^3$		9.7	9.7		
	$ML_4/M.L^4$			10.2		
	$M_2L/M^2.L$		4.7[e]	(2.7)		
	$M_4L_4/M^4.L^4$		27.5[e] ±0.0	(25.6)		
	$M.L^2/ML_2(s)$		-14.6	-14.9		
Ni^{2+}	ML/M.L	3.7[a]	3.8 -0.1	4.1	(-1)[r]	(20)
	$ML_2/M.L^2$			8		
	$ML_3/M.L^3$			11		
	$M_2L/M^2.L$		4.2[e]	(3.3)		
	$M_4L_4/M^4.L^4$		29.37[e]±0.03	28.3	-12.8[e]	92[e]
	$M.L/ML_2(s)$			-15.2		
Cu^{2+}	ML/M.L			6.3		
	$ML_2/M.L^2$		12.8			
	$ML_3/M.L^3$		14.5			
	$ML_4/M.L^4$		15.6	16.4		
	$M_2L_2/M^2.L^2$	17.02[h]±0.03	17.28[j]	17.7		
			17.8[e]		-10.4[e]	47[e]
	$M.L^2/ML_2(s)$	-18.48[q]	-18.9	-19.32	13.2[d]	-40q
	$M.L^2/MO(s)$	-19.51[q]		-20.35		
Ti^{3+}	ML/M.L	11.8	11.5[e] ±0.1	12.7		
	$M_2L_2/M^2.L^2$		24.8[e] ±0.3			
V^{3+}	ML/M.L		11.01[j]	11.7	(-4)[z]	(40)[c]
			11.11[e]			
	$M_2L_2/M^2.L^2$		23.8[j]	24.2		
			23.43[e]			
	$M_2L_3/M^2.L^3$		34.5[e]			
	$M.L^3/ML_3(s)$			-34.4		

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[a] 25°, 0.1; [c] 25°, 1.0; [d] 25°, 2.0; [e] 25°, 3.0; [h] 20°, 0.1; [j] 20°, 1.0; [q] 25°, 0.2
[r] 15-42°, 0; [z] 25-50°, 1.4

Hydroxide ion (continued)

Metal ion	Equilibrium	Log K 25°, 0.5	Log K 25°, 1.0	Log K 25°, 0	ΔH 25°, 0	ΔS 25°, 0
Cr^{3+}	ML/M.L	9.41[i]	9.41	10.07 ±0.02	-1.0	43
		9.77[h]±0.03				
	$ML_2/M.L^2$	17.3[h]			(4.5)	(94)[h]
	$M_2L_2/M^2.L^2$	24.6[d]	24.1			
	$M_4L_4/M^4.L^4$	50.7[d]				
	$M_4L_6/M^4.L^6$	72.8[d]				
	$M.L^3/ML_3(s)$	-29.8[a] ±0.1				
Mn^{3+}	ML/M.L			14.4[f]	(-8)[m]	(40)[f]
Fe^{3+}	ML/M.L	11.01 ±0.07	11.09 ±0.1	11.81 ±0.03		
		11.17[a]±0.09	11.21[e]±0.08		-2[e]	(45)[e]
		11.14[d]				
	$ML_2/M.L^2$		21.9[j]	22.3		
			22.1[e]			
	$ML_4/M.L^4$			34.4		
	$M_2L_2/M^2.L^2$	24.7	24.9 -0.1	25.1		
		24.7[a]	25.6[e] ±0.2		-16.2[e]	(63)[e]
		25.3[d]				
	$M_3L_4/M^3.L^4$		51.0[e]	49.7	-38[e]	(106)[e]
	$M.L^3/ML_3(s)$		-38.6[e]	-38.8 ±0.2		
	$M.L^3/MOOH(s,\alpha)$		-41.1[e]	41.5		
	$M.L^3/(M_2O_3)^{0.5}(s,\alpha)$			-42.7		
Co^{3+}	ML/M.L		13.52[e]			
	$M.L^3/ML_3(s)$			-44.5[o]	(18)[r]	(-140)[o]
Rh^{3+}	ML/M.L		10.67[l]		(-9)[v]	(20)[l]
Ti(IV)	$ML_4/ML_2.L^2$	22.6[a]				
Zr^{4+}	ML/M.L			14.3		
				13.9[f]		
	$ML_5/M.L^5$			54.0		
	$M_3L_4/M^3.L^4$	50.5[d]		55.4		
	$M_4L_8/M^4.L^8$	103.4[d]		106.0		
	$M.L^4/MO_2(s)$		-52.0[j]	-54.1		

[a] 25, 0.1; [d] 25°, 2.0; [e] 25°, 3.0; [h] 20°, 0.1; [i] 20°, 0.5; [j] 20°, 1.0; [l] 25°, 2.5; [m] 1-35°, 4.0; [o] 19°, 0; [r] 19-81°, 0; [v] 25-60°, 2.5

Hydroxide ion (continued)

Metal ion	Equilibrium	Log K 25°, 0.5	Log K 25°, 1.0	Log K 25°, 0	ΔH 25°, 0	ΔS 25°, 0
Hf^{4+}	ML/M.L			13.7		
				13.3[f]		
	$ML_5/M.L^5$			52.8		
	$M.L^4/MO_2(s)$			-54.8		
VO^{2+}	ML/M.L		7.9[e]	8.3		
	$ML_2/M.L^2$		18.31[e]			
	$M_2L_2/M^2.L^2$		28.35[e]	21.3		
	$M.L^2/ML_2(s)$			-23.5		
TcO^{2+}	ML/M.L	12.6[h]				
	$ML_2/M.L^2$	24.2[h]				
OsO_4	ML/M.L		1.8			
	$ML_2/M.L^2$		1.1			
Cu^+	$M.L/(M_2O)^{0.5}(s)$			-14.7 +0.1	-1.5[i]	-72
Ag^+	ML/M.L			2.0		
	$ML_2/M.L^2$		3.55[e]	3.99		
	$M.L/(M_2O)^{0.5}(s)$	-7.37[u]	-7.18	-7.71 ±0.02	8.1	-8
		-7.15[d]	-7.42[e]			
Hg_2^{2+}	ML/M.L	8.7				
CH_3Hg^+	ML/M.L	9.24[a]±0.02			-8.5[h]	14[a]
	$M_2L/ML.M$	2.37[a]				
Tl^+	ML/M.L	0.30	0.26	0.79	0.4	5
			0.08[e]	-0.10[g]	(1.8)[e]	(6)[e]
	$ML_2/M.L^2$		(-0.8)[e]		(6.8)[e]	(19)[e]
$(CH_3)_2Tl^+$	ML/M.L			1.05		
	$M_2L_2/M^2.L^2$			1.23		
$(CH_3)_3Sn^+$	ML/M.L	7.54[d]	7.58[e]			
	$M_2L/M^2.L$	8.5[d]				
	$M_2L_2/M^2.L^2$	14.1[d]				
$(C_2H_5)_3Sn^+$	ML/M.L		7.37[e]			

[a] 25°, 0.1; [d] 25°, 2.0; [e] 25°, 3.0; [f] 25°, 4.0, assuming HL/H.L = 14.4; [g] 25°, 5.0; [h] 20°, 0.1; [i] 19°, 0.25; [u] 25°, 0.3

Hydroxide ion (continued)

Metal ion	Equilibrium	Log K 25°, 0.5	Log K 25°, 1.0	Log K 25°, 0	ΔH 25°, 0	ΔS 25°, 0
$(C_6H_5)_3Sn^+$	$ML/M.L$	9.2[q]				
$(C_6H_5)_3Pb^+$	$ML/M.L$	7.7[q]				
Pd^{2+}	$ML/M.L$	12.4[a]		13.0		
	$ML_2/M.L^2$	25.2[a]		25.8		
	$M.L^2/ML_2(s)$			-28.5		
Zn^{2+}	$ML/M.L$			5.0 ±0.0	(0)[r]	(25)
	$ML_2/M.L^2$		8.3[e]	(11.1)		
	$ML_3/M.L^3$		13.7[e]	13.6		
	$ML_4/M.L^4$		18.0[e]	(14.8)		
	$M_2L/M^2.L$		5.5	5.0		
	$M.L^2/ML_2$(s,amorphous)		-14.82[q]	-15.52	7.5[d]	-43
	$M.L^2/ML_2(s,\beta_1)$		-15.54[q]	-16.24		
	$M.L^2/ML_2(s,\beta_2)$		-15.50[q]	-16.20		
	$M.L^2/ML_2(s,\gamma)$		-15.56[q]	-16.26		
	$M.L^2/ML_2(s,\delta)$		-15.45[q]	-16.15		
	$M.L^2/ML_2(s,\varepsilon)$		-15.77[q]	-16.46 ±0.04		
	$M.L^2/MO(s)$		-15.96[q]	-16.66	5.4[d]	-55
Cd^{2+}	$ML/M.L$		4.1[e] ±0.2	3.9	0.0[e]	19[e]
	$ML_2/M.L^2$		7.7[e]	7.7		
	$ML_3/M.L^3$		10.3[e]			
	$ML_4/M.L^4$		12.0[e]	(8.7)		
	$M_2L/M^2.L$		5.08[e]	4.6	-2.2[e]	16[e]
	$M_4L_4/M^4.L^4$		24.9[e]	23.2	-11.8[e]	74[e]
	$M.L^2/ML_2(s,\beta)$		-14.29[e]	-14.35	4.1	-52
	$M.L^2/ML_2(s,\gamma)$		-14.10[e]			
Hg^{2+}	$ML/M.L$	10.0	10.1	10.6		
			10.8[e] ±0.2		-5.9[e]	30[e]
	$ML_2/M.L^2$	21.0 ±0.2	21.1 ±0.2	21.8 +0.1		
		21.2[a]				
		21.6[d]	22.2[e] ±0.2		-16.4[e]	47[e]
	$ML_3/M.L^3$			20.9		
	$M_2L/M^2.L$		11.5[e]	10.7	-10.0[e]	19[e]
	$M_3L_3/M^3.L^3$		36.1[e]	35.6		
	$M.L^2/MO$(s,red)		-26.0[e]	-25.44	7.9[c]	-93[e]

[a] 25°, 0.1; [c] 25°, 1.0; [d] 25°, 2.0; [e] 25°, 3.0; [q] 25°, 0.2; [r] 15-42°, 0;

Hydroxide ion (continued)

Metal ion	Equilibrium	Log K 25°, 0.5	Log K 25°, 1.0	Log K 25°, 0	ΔH 25°, 0	ΔS 25°, 0
Ge^{2+}	$ML_2/MO(s,brown)$			-3.7		
Sn^{2+}	$ML/M.L$		10.4^{e} ±0.1			
	$M_2L_2/M^2.L^2$		23.9^{e}			
	$M_3L_4/M^3.L^4$		49.93^{e}±0.03			
	$M.L^2/MO(s)$			-26.2		
$(CH_3)_2Sn^{2+}$	$ML/M.L$	10.53^{a}	10.63^{e}			
	$ML_2/M.L^2$	19.04^{a}	19.36^{e}			
	$ML_3/M.L^3$	29.8^{a}				
	$ML_4/M.L^4$	43.4^{a}				
	$M_2L_2/M^2.L^2$	22.6^{a}	23.8^{e}			
	$M_4L_6/M^4.L^6$	65.8^{a}	68.9^{e}			
$(C_2H_5)_2Sn^{2+}$	$ML/M.L$		11.25			
			10.78^{e}			
	$ML_2/M.L^2$		20.31			
	$M_2L_2/M^2.L^2$		23.8			
			24.0^{e}			
	$M_2L_3/M^2.L^3$		34.1			
$(C_3H_7)_2Sn^{2+}$	$ML/M.L$		11.26^{e}			
	$M_2L_2/M^2.L^2$		24.8^{e}			
Pb^{2+}	$ML/M.L$	6.0^{u}	6.3^{e}	6.3		
	$ML_2/M.L^2$	10.3^{u}	10.9^{e}	10.9		
	$ML_3/M.L^3$	13.3^{u}	13.7^{e}	13.9		
	$M_2L/M^2.L$		7.9^{e}	7.6		
	$M_3L_4/M^3.L^4$	31.7^{u}	33.8^{e}	32.1	-25.9^{e}	63^{e}
	$M_4L_4/M^4.L^4$	35.1^{u}	37.5^{e}	(35.1)	-32.3^{e}	68^{e}
	$M_6L_8/M^6.L^8$	67.4^{u}	71.3^{e}	68.4	-55.4^{e}	141^{e}
	$M.L^2/(M_2OL_2)^{0.5}(s)$			-14.9		
	$M.L^2/MO(s,yellow)$			-15.1		
	$M.L^2/MO(s,red)$			-15.3		
$(CH_3)_2Pb^{2+}$	$ML_2/M.L^2$		12.82^{e}			
	$ML_3/M.L^3$		14.0^{e}			
	$M_2L_2/M^2.L^2$		17.53^{e}			
	$M_3L_4/M^3.L^4$		32.4^{e}			

[a] 25°, 0.1; [e] 25°, 3.0; [u] 25°, 0.3

Hydroxide ion (continued)

Metal ion	Equilibrium	Log K 25°, 0.5	Log K 25°, 1.0	Log K 25°, 0	ΔH 25°, 0	ΔS 25°, 0
Au(III)	$ML_4/ML_3.L$			2.3		
	$ML_5/ML_4.L$			0.6		
	$ML_3/ML_3(s)$			-5.5		
Al^{3+}	ML/M.L	8.48[a]+0.5	8.31	9.01 ±0.03	(-1)[r]	(40)
	$ML_2/M.L^2$	(17.6)[a]		(18.7)		
	$ML_3/M.L^3$	(25.7)[a]		(27.0)		
	$ML_4/M.L^4$			33.0		
	$M_2L_2/M^2.L^2$		20.0	20.3	(-9)[t]	(60)[c]
	$M_3L_4/M^3.L^4$		42.5	42.1	(-19)[t]	(130)[c]
	$M_{13}O_4L_{24}.H^8/M^{13}.L^{32}$		336.5	349.2	(-156)[t]	(1020)[c]
	$M.L^3/ML_3(s,\alpha)$			-33.5		
Ga^{3+}	ML/M.L	10.8		11.4		
		10.9[a] ±0.2				
	$ML_2/M.L^2$	21.5[a]		22.1		
	$ML_3/M.L^3$	30.9[a]		31.7		
	$ML_4/M.L^4$			39.4		
	$M.L^3/ML_3$(s,amorphous)			-37		
	$M.L^3/MOL(s)$			-39.1		
In^{3+}	ML/M.L	(10.5)[a]	9.76[e]±0.0	10.0	-8.2[e]	17[e]
	$ML_2/M.L^2$	(20.3)[a]	19.6[e] +0.5	20.2		
	$ML_3/M.L^3$	(29.3)[a]		29.6		
	$ML_4/M.L^4$			33.9		
	$M_3L_4/M^3.L^4$		47.4[e]	50.2		
	$M.L^3/ML_3(s)$			-36.9		
	$M.L^3/(M_2O_3)^{0.5}(s)$			-35.9		
Tl^{3+}	ML/M.L	(12.8)[a]	13.02[e]±0.02	13.4	(11)[e]	(100)[e]
	$ML_2/M.L^2$	(25.3)[a]	25.75[e]±0.02	26.4	(23)[e]	(200)[e]
	$ML_3/M.L^3$	(37.6)[a]		(38.7)		
	$ML_4/M.L^4$		40.0[e]	41.0		
	$M.L^3/(M_2O_3)^{0.5}(s)$		-45.0[e]	-45.2		

[a] 25°, 0.1; [c] 25°, 1.0; [e] 25°, 3.0; [r] 0-40°, 0; [t] 63-153°, 1.0 molal

Hydroxide ion (continued)

Metal ion	Equilibrium	Log K 25°, 0.5	Log K 25°, 1.0	Log K 25°, 0	ΔH 25°, 0	ΔS 25°, 0
Sb(III)	$ML_2/ML.L$(in HNO_3)		15.5[g]			
	$ML_3/ML_2.L$			12.8		
	$ML_4/ML_3.L$			2.2		
	$M_2L_2/(ML_2)^2.H^2$ (in $HClO_4$)		0.7[g]			
	$ML_2/H.(M_2O_3)^{0.5}$(s,rhombic)		-3.06g	-3.09		
	$ML_2/H.(M_2O_3)^{0.5}$(s,cubic)		-3.18[g]			
Bi^{3+}	ML/M.L	12.36[a]	12.60[e]	12.9		
	$ML_3/M.L^3$	31.9[a]		33.1		
	$ML_4/ML_3.L$		0.95	1.1		
	$M_6L_{12}/M^6.L^{12}$		164.95			
			170.49[e]			
	$M_9L_{20}/(M_6L_{12})^{1.5}.L^2$	23.9[a] ±0.2				
	$M_9L_{21}/M_9L_{20}.L$	10.6[a] ±0.0				
	$M_9L_{22}/M_9L_{21}.L$	11.1[a] ±0.1				
	$ML_2/(M_2O_3)^{0.5}$(s,α)		-5.34	-5.4		

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[a] 25°, 0.1; [e] 25°, 3.0; [g] 25°, 5.0, assuming HL/H.L = 14.6

Bibliography:

H^+ 17LB,23LR,29O,30R,33HH,36W,55A,57AG, 57IL,58A,59L,60CO,60NM,63GL,63HIa,63VS, 64FB,67A,67AK,67AKa,67EHP,67GL,67VLa, 68GH,69VL,70GO,72CB,72CK,72JW,72O,73DH, 74BA,74SM,74SS

Li^+-K^+ 64O,76BM

Be^{2+} 56GG,56KS,60SG,61COa,62COa,63FS,64HS, 67BT,67MB,67OK,68LC,68PG,69SW,73CG, 76BM

Mg^{2+} 29K,48SD,61PB,63FS,63Hb,63L,67YM,76BM

Ca^{2+} 34K,49BPa,51DH,53BG,54GMa,56BPa,59BBC, 60G,61CO,61PB,63FS,65HW,76BM

Sr^{2+} 52CM,54GMa,61CO,67H,76BM

Ba^{2+} 49BPa,54GMa,61CO,65HWb,67H,76BM

Sc^{3+} 56BK,66A,68AN,71AO,76BM

Y^{3+} 60AS,64BC,66FK,76BM

La^{3+} 60AS,61BC,66FK,76BM

Ce^{3+} 59AS,64BN,76BM

Pr^{3+},Lu^{3+} 63A,66FK

Nd^{3+} 59TG,63A,66FK,73BL,76BM

Sm^{3+} 60ASa,66FK

Eu^{3+},Tb^{3+},Ho^{3+} 61AE,66FK

Gd^{3+} 63A,66FK,74NBa

Dy^{3+} 60ASb,66FK

Er^{3+},Yb^{3+} 60Aa,66FK

Tm^{3+} 66FK

Pu^{3+} 49KD,69DH

Am^{3+}-Cf^{3+} 69DH,69GM

Ce^{4+} 51HR,66OS,67D,74AM

Th^{4+} 54KH,61KB,65BM,68HS,76BM

Pa^{4+} 65G,68Ga,76BM

U^{4+} 50KN,55KN,56DZ,59SH,64MW

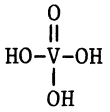
Hydroxide ion (continued)

Np^{4+} 59SHC,76BM
Pu^{4+} 49H,50KN,60RK,65Pa
Pa(V) 66Ga,68Gb,76BM
UO_2^{2+} 54AHS,56DZ,60GR,62BM,62Sc,63DH,63DS, 63HR,63RJ,68ASa,69VO,76BM
NpO_2^{2+} 72CMT,76BM
PuO_2^{2+} 71S,72CMP,76BM
Mn^{2+} 41FS,42Na,52CC,62Pa,68FB
Fe^{2+} 53H,53LK,56GW,76BM
Co^{2+} 42Nb,50GG,62BA,63BPa,63SD,67CB,70BZ, 70GHa,76BM
Ni^{2+} 49GG,52CC,63SD,64P,65BLa,65BLS,66BI, 68A,73KO,76BM
Cu^{2+} 53SL,56B,60P,64Wa,65SAH,68AP,70GH,76BM
Ti^{3+} 62PF,68PGa,70KB
V^{3+} 50FG,53Ga,63P,68MB,76BM
Cr^{3+} 10B,27BK,54W,58BJ,63TU,64SM,64Wa,67SKV, 68ML,73MS
Mn^{3+} 67WD
Fe^{3+} 34BH,41Ba,51BB,51SV,52T,52WT,53Ha,54CT, 55MV,56CH,57BS,57Ma,58La,59P,60RS,62Sd, 63FS,63PL,63SM,68AS,69F,72S
Co^{3+} 53Se,66CN
Rh^{3+} 66SHa
Ti(IV) 76BM
Zr^{4+} 56ZC,61PM,69NM,73Na
Hf^{4+} 62Pa,71NAa,73Na
VO^{2+} 53Ga,55RR,66Ba
TcO^{2+} 69GK
Cu^{+} 53SL,63FS,76BM
Ag^{+} 27L,37PS,60AD,60AHS,60BH,60BS,60NM
Hg_2^{2+} 52FH
CH_3Hg^{+} 65SS,66GD,73LR,74A
Tl^{+} 53BG,56BP,70KY,73KK,76BM
$(CH_3)_2Tl^{+}$ 74LP
$(CH_3)_3Sn^{+}$ 66TF,68AC
$(C_2H_5)_3Sn^{+}$ 64TY
$(C_6H_5)_3Sn^{+}$,$(C_6H_5)_3Pb^{+}$ 65SM
Pd^{2+} 67IE
Zn^{2+} 53SL,55SL,60DF,62Bb,62Pb,62SA,63PE, 63SA,64SA,65Sd,72DS,76BM
Cd^{2+} 59Sf,59SLa,62BC,62DL,63Sd,64SM, 67AKa,76BM
Hg^{2+} 38GH,52HS,54G,58ASP,59SL,61AH,61DT, 62A,63FS,67AK,70CGM,76BM
Ge^{2+} 52JL
Sn^{2+} 41GH,42GL,59T,74G
$(CH_3)_2Sn^{2+}$ 64TY,64TYa,65TF
$(C_2H_5)_2Sn^{2+}$ 66TF,68AC
$(C_3H_7)_2Sn^{2+}$ 66TF
Pb^{2+} 39GV,60C0,60O,63CO,62PO,76BM
$(CH_3)_2Pb^{2+}$ 66FT
Au(III) 38JL
Al^{3+} 54ST,55Ka,56Kf,62FP,65Ab,69NN,71MB, 71VP,76BM
Ga^{3+} 52WT,57F,68NA,73BN
In^{3+} 56Ba,56RR,59ASa,61Sc,63FS,69BNR, 72Fa,76BM
Tl^{3+} 51Sa,53B,58S,61RW,64KY,69BNT,73KK, 76BM
Sb(III) 52GG,74AB
Bi^{3+} 57O,59O,60Tb,71Ba,72DN,76BM

Other references: 00A,00D,00KH,00L,00N, 01L,02NK,02S,03AC,03B,05G,05SA,06B, 06GE,07K,07L,07P,08B,08D,08M,09A, 09LB,09S,10A,10B,10NK,10W,13K,16V, 17K,19L,20F,21G,21LF,22AR,23B,23H, 23K,24JG,24JJ,24RK,24S,24Ba,25G,25H 25Sa,25W,25WR,26Ba,27Da,27DJ,27S, 28BV,28FM,28Pa,28Pb,28RS,29B,29BU, 29S,29T,30E,30NB,30R,31KE,31KK,31P, 32BR,32E,32IS,32M,32RF,33BW,33FM,33J, 33KA,34Bb,34BH,34La,34M,35D,36H, 36HD,36MJ,36SE,36SH,37C,37CB,37P,

Hydroxide ion (continued)

Other references: 37Q,38CF,38LJ,38O,39Ga, 39GH,39H,39L,40BC,41K,41Ma,42DM,42H,42MR, 42N,42RS,43B,43N,43P,43SK,44F,44La,44MK, 45P,46M,47GD,47HK,47M,48F,48GF,48HS,48KA, 48SP,49A,49B,49EP,49KDa,49KK,49KN,49L, 59NT,49OS,49S,50A,50AF,50BQ,50BW,50ET, 50MK,51Ab,51D,51Da,51DB,51DC,51FR,51HD, 51Mc,51MF,51PN,51Q,51S,51V,52B,52GW, 52HH,52J,52Ja,52KF,52KH,52KP,52Lb,52Se, 52VR,53Ea,53IY,53KF,53KP,53M,53MK,53RS, 53VT,53WS,54AH,54BBS,54D,54F,54FH,54FSa, 54G,54GL,54H,54KP,54M,54NR,54Ra,55B,55BS, 55DC,55GL,55Kc,55MS,55PH,55PK,55R,55SC, 55V,55WW,55ZD,56C,56CK,56DP,56DZd,56GWb, 56H,56IA,56J,56JP,56Kd,56Ke,56KF,56KSa, 56OB,56PC,56SP,56SW,57B,57BG,57Ca,57GL, 57GW,57HW,57Kb,57Kc,57Kd,57MO,57MT,57P, 57PP,57R,57TE,57TMa,57ZM,58Ab,58AS,58B, 58BB,58Cb,58GTZ,58K,58KG,58MG,58MP,58TG, 58VP,58VPa,58VRa,58VS,59A,59ASb,59ASc,, 59BE,59EG,59GS,59HS,59HSa,59I,59KB, 59KGa,59KL,59MA,59MV,59OH,59W,60Ba,60BB, 60BK,60BN,60Cc,60F,60Gb,60GB,60JP,60S, 60SWa,61A,61B,61BL,61BP,61Ka,61KBa,61KT, 61MN,61Nc,61P,61PP,61PS,61RK,61RL,61WL, 62B,62DG,62IN,62KB,62KB,62La,62LG,62M, 62N,62PPC,62RB,62RF,62BA,62BG,63BF,63BJ, 63DD,63Hd,63Kb,63KBa,63KS,63LC,63PS,63SA, 63SB,64Aa,64Bb,63BSa,63Ca,64DSa,64FC, 64G,64H,64HSa,64KB,64LD,64NK,64NL,64Pa, 64PH,64Sa,64SAa,64SMa,64ST,64Ta,65AKP, 65BS,65F,65Ga,65GA,65GCa,65H,65KY,65NT, 65RD,65Sf,65SAP,65SSa,65ZS,66Ba,66BB, 66BM,66HF,66KA,66KS,66OP,66Sa,66SI, 66SWa, 67AKE,67Bc,67C,67GK,67GP,67GS, 67GSb,67H,67HC,67La,67LK,67MP,67PB,67SI, 67SSd,68DM,68GS,68HC,68HM,68KA,68MG, 68RR,68SF,68SM,68SR,68WS,68ZL,68ZP,69BS, 69CR,69FT,69GA,69H,69LS,69M,69MGa,69MKa,69Nb, 69RC,69RS,69SMK,69VB,69WS,70C,70EL,70GH,70HR, 70IE,70Ld,70MS,70NK,70OE,70SB,70SK,70VT, 71BZ,71DB,71GD,71HR,71IB,71KP,71KS,71Ma, 71Mb,71MKK,71NA,72CB,72HH,72MB,72MG,73MV, 72OK,72SK,72US,73AK,73Ba,73BF,73FJ,73G, 73GG,73GT,73HHb,73RR,73SB,74HI,74KY, 74NB,74RN,74VZ



H_3O_4V Hydrogen vanadate (vanadic acid) H_3L

Metal ion	Equilibrium	Log K 25°, 0.5	Log K 25°, 1.0	Log K 25°, 0	ΔH 25°, 0	ΔS 25°, 0
H^+	$HL/H.L$	13.0		14.3		
		13.5[h]		13.2[e]		
	$H_2L/HL.H$	7.85	8.04[j]	8.5		
		8.23[h]	8.31[h,r]			
	$H_3L/H_2L.H$	3.78		4.0		
	$VO_2/H_3L.H$	3.20		3.3		
	$V_2O_7/(HL)^2$	0.4		0.6		
	$HV_2O_7/(HL)^2.H$	10.58		11.0		
				10.93[e]		
	$V_3O_9/(HL)^3.H^3$	30.66	31.6[e]	31.8		
	$V_4O_{12}/(HL)^4.H^4$	41.4				
	$V_4O_{12}/V_4O_{13}.H^2$	8.9				
	$V_3O_9/(H_2L)^3$	7.14[s]				
	$V_4O_{12}/(H_2L)^4$	10.10[s]				
	$HV_6O_{17}/(H_2L)^6.H^3$	33.04[s]				
	$V_{10}O_{27}/(H_2L)^{10}.H^6$	61.8[s]				
	$VO_2/H.(V_2O_5)^{0.5}(s)$			-0.68	4.2	11
	$V_{10}O_{27}.H^{14}/(VO_2)^{10}$		-6.8	-5.5[e]		
	$V_{10}O_{27}/HV_{10}O_{28}.H$	4.34[h]	3.6	3.5[e]		
		4.45[h,r]	3.6[j]			
		4.39[s]	4.5[j,r]			
	$HV_{10}O_{28}/V_{10}O_{28}.H$	6.94[h]	5.8			
		7.52[h,r]	6.06[j]			
			7.6[j,r]			
Li^+	$MV_{10}O_{28}/M.V_{10}O_{28}$	1.6[h,r]				
	$M_2V_{10}O_{28}/MV_{10}O_{28}.M$	0.6[h,r]				
	$MHV_{10}O_{28}/M.HV_{10}O_{28}$	0.6[h,r]				

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[e] 25°, 3.0; [h] 20°, 0.1; [j] 20°, 1.0; [r] $(CH_3)_4NCl$ used as background electrolyte; [s] 40°, 0.5

Hydrogen vanadate (continued)

Metal ion	Equilibrium	Log K 25°, 0.5	Log K 25°, 1.0	Log K 25°, 0	ΔH 25°, 0	ΔS 25°, 0
Na^+	MHL/M.HL		0.30[j,r]			
	$MV_{10}O_{29}/M.V_{10}O_{28}$	1.6[h,r]				
	$M_2V_{10}O_{28}/MV_{10}O_{28}.M$	0.6[h,r]				
	$MHV_{10}O_{28}/M.HV_{10}O_{28}$	0.7[h,r]				
K^+	MHL/M.HL		0.04[j,r]			
	$MV_{10}O_{28}/M.V_{10}O_{28}$	2.4[h,r]				
	$M_2V_{10}O_{28}/MV_{10}O_{28}.M$	1.0[h,r]				
	$MHV_{10}O_{28}/M.HV_{10}O_{28}$	1.4[h,r]				
Rb^+	$MV_{10}O_{28}/M.V_{10}O_{28}$	2.8[h,r]				
	$MHV_{10}O_{28}/M.HV_{10}O_{28}$	1.8[h,r]				
Cs^+	$MV_{10}O_{28}/M.V_{10}O_{28}$	3.18[h,r]				
	$MHV_{10}O_{28}/M.HV_{10}O_{28}$	2.20[h,r]				
NH_4^+	$M.H_2L/MVO_3(s)$			-3.5	7.2	8

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[h] 20°, 0.1; [j] 20°, 1.0; [r] $(CH_3)_4NCl$ used as background electrolyte.

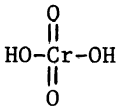
Bibliography:

H^+ 55LC,56RRa,58NL,59IB,60BI,63SG,64BI, 64DS,66B,66BSW,76BM

Li^+-Cs^+ 63SG

NH_4^+ 74VKL

Other references: 46SC,50SSa,56TS,57La, 58SPa,59NQ,60BC,60Ca,60Sa,63SZ,64DG, 64NH,64YK,65PSZ,66I,67TK,73R,74IG, 74IGG



H_2O_4Cr Hydrogen chromate (chromic acid) H_2L

Metal ion	Equilibrium	Log K 25°, 0.5	Log K 25°, 1.0	Log K 25°, 0	ΔH 25°, 0	ΔS 25°, 0
H^+	HL/H.L	5.81	5.74	6.51 ±0.02	0.7	32
		6.09[a]±0.04	5.90[e]		1.1[e]	31[e]
	H_2L/HL.H	-0.7[i]	-0.7 ±0.1	-0.2[o]	(9)[r]	(27)[c]
		-0.6[h]	-0.6[e]			
	$Cr_2O_7/(HL)^2$	1.84	1.97 ±0.03	1.53 ±0.02	-4.7	-9
		1.72[a]±0.02	2.17[e]±0.03		-4.8[e]	-6[e]
K^+	ML/M.L			(0.57)[n]		
Ba^{2+}	M.L/ML(s)	-8.51	-8.39	-9.67 ±0.01	(8)[s]	(-17)
		-8.96[a]				
Th^{4+}	ML.H/M.HL	0.67[t]			(4)[u]	(15)
NpO_2^{2+}	ML.H/M.HL	1.81[t]			(1)[u]	(12)
Cu^{2+}	M.L/ML(s)			-5.44		
Fe^{3+}	ML.H/M.HL	0.28[t]			(3)[u]	(12)
Ag^+	$M^2.L/M_2L$(s)			-11.92 ±0.03	(15)[v]	(-4)
Hg_2^{2+}	M.L/ML(s)			-8.70		
Tl^+	$M^2.L/M_2L$(s)			-12.01		

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[a] 25°, 0.1; [e] 25°, 3.0; [h] 20°, 0.1; [i] 20°, 0.5; [n] 18°, 0; [o] 20°, 0; [r] 15-35°, 1.0; [s] 18-28°, 0; [t] 25°, 0.2; [u] 1-25°, 0.2; [v] 20-40°, 0

Bibliography:

H^+ 34NR,53TK,55DP,58Hb,58HN,58SM,60BC, 61Tb,62Sa,64HR,64T,65La,66TJ,67LB, 68HSa,68LJ,70Lc,72AJ,72LL

K^+ 31BR

Ba^{2+} 43BR

Th^{4+},NpO_2^{2+},Fe^{3+} 72BT

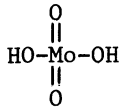
Cu^{2+} 51PC

Ag^+ 35CM,41M,54Pa

Hg_2^{2+} 29B

Tl^+ 53Sa

Other references: 05AS,07S,10BS,23B,24B, 28H,28Ja,28S,32BR,32HJ,36E,41SW,42D, 42KP,43BR,51K,53PH,54TK,56C,57HN, 58KGL,60SS,63EK,63K,64MKc,66E,66HN, 66MB,67JJ,68PW,73AB



H_2O_4Mo Hydrogen molybdate (molybdic acid) H_2L

Metal ion	Equilibrium	Log K 20°, 0.1	Log K 25°, 1.0	Log K 25°, 0	ΔH 25°, 0	ΔS 25°, 0
H^+	HL/H.L		3.55	4.24[o]		
			3.89[e]		14[e]	65[e]
	$H_2L/H^2.L$	7.75	7.20	8.24[o]		
			7.50[e]			
	$Mo_7O_{24}/H^8.L^7$		52.81			
			57.74[e]		-56.0[e]	76[e]
	$HMo_7O_{24}/Mo_7O_{24}.H$		4.57			
			4.40[e]		2.6[e]	29[e]
	$H_2Mo_7O_{24}/HMo_7O_{24}.H$		3.63			
			3.54[e]		0.8[e]	19[e]
	$H_3Mo_7O_{24}/H_2Mo_7O_{24}.H$		2.38			
			2.53[e]		-0.6[e]	10[e]
	$M_{19}O_{59}/H^{34}.L^{19}$		196.3[e]			
	$H^2.L/MoO_3(s)$			-12.1		
Ca^{2+}	M.L/ML(s)			(-8.0)	(-0.7)	(-39)
Ag^+	$M^2.L/M_2L(s)$			-11.55	12.6	-11
Pb^{2+}	M.L/ML(s)			(-13.0)	(11.9)	(-20)

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[e] 25°, 3.0; [o] 20°, 0

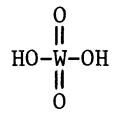
Bibliography:

H^+ 58SM,63RC,63AA,64SS,68ASb,68SS,76BM

Ca^{2+},Pb^{2+} 58MH

Ag^+ 54Pb,56MH

Other references: 31N,34BG,53PH,54IK, 56DZc,57DB,58SS,58YA,60Da,61Sd, 61Ta,63CK,63F,63LZ,63SBa,63YR,65C, 65CO,67Ab,67HS,67VDa,68DK,69BW, 74JJ



H_2O_4W Hydrogen wolframate (tungstic acid) H_2L

Metal ion	Equilibrium	Log K 20°, 0.1	Log K 25°, 1.0	Log K 25°, 0	ΔH 25°, 0	ΔS 25°, 0
H^+	$HL/H.L$	3.5				
	$H_2L/H^2.L$	8.1	11.30[e]			
	$HW_6O_{21}/H^7.L^6$				-64.5	
			60.76[e]		-62.5[e]	68[e]
	$HW_6O_{21}/W_6O_{21}.H$		8.30[e]		-5[e]	21[e]
	$W_{12}O_{41}/H^{14}.L^{12}$		123.2[e]		127[e]	138[e]
	$HW_{12}O_{41}/W_{12}O_{41}.H$	6.28	5.0[j]			
	$H_2W_{12}O_{41}/HW_{12}O_{41}.H$	5.27	4.3[j]			
	$H_3W_{12}O_{41}/H_2W_{12}O_{41}.H$	3.6				
	$H^2.L/WO_3(s)$			-14.05		
	$H^2.L/H_2WO_4(s)$				13.0	
Ag^+	$M^2.L/M_2L(s)$			-11.26	14.7	-2

[e] 25°, 3.0; [j] 20°, 1.0

Bibliography:

H^+ 56DZa,58GH,58SM,62DK,62SG,69A,74AS

Ag^+ 54Pc,58GH

Other references: 33LH,34BG,58F,60Cb,64A, 64YP,65SP,65YR,69NP,71TM

ReO_4^-

O_4Re^- Rhenate (VII) ion L^-

Metal ion	Equilibrium	Log K 25°, 0
K^+	ML/M.L	(0.72)

Bibliography: 48M

Other references: 60BC,63SK,660A,700P

$H_4Fe(CN)_6$

$C_6H_4N_6Fe$ Hydrogen hexacyanoferrate (II) H_4L

Metal ion	Equilibrium	Log K 25°, 0.2	Log K 25°, 1.0	Log K 25°, 0	ΔH 25°, 0	ΔS 25°, 0
H^+	HL/H.L	3.25		4.30 ±0.05	0.5	21
	H_2L/HL.H	1.79		2.6 ±0.4	1	15
K^+	ML/M.L	1.5[a]		2.34 ±0.04	1.0	14
Mg^{2+}	ML/M.L			3.8		
Ca^{2+}	ML/M.L			3.8 -0.2	2.1[a]	24
	M_2L/ML.M			1.4		
Ba^{2+}	ML/M.L			3.8		
La^{3+}	ML/M.L			5.1		
Ag^+	$M^4.L/M_4L(s)$			-44.07		
Tl^+	ML/M.L			3.00	(1)[r]	(17)
			0.82[e]		-1.8[e]	-2[e]
Zn^{2+}	$M^2.L/M_2L(s)$			-15.68		
Cd^{2+}	$M^2.L/M_2L(s)$			-17.38		
Pb^{2+}	$M^2.L/M_2L(s)$			-18.02		

[a] 25°, 0.1; [e] 25°, 3.0; [r] 25-50°, 0

Bibliography:

H^+ 35KT,41NZ,57HH,67HI
K^+ 37D,57CP,66CL,67EG
Mg^{2+},Ba^{2+} 57CP
Ca^{2+} 49Ja,74HI
La^{3+} 58PW
Ag^+,Zn^{2+}-Pb^{2+} 64RP
Tl^+ 58PW,67MKa

Other references: 34R,38PO,41LK,53BG,56TG, 57BLa,57BP,58BS,58DT,59BBD,59BS, 59BSB,60BR,61BS,62BB,62JE,66MD,66NS, 66SNa,68LM,69NS,70Bb

$Fe(CN)_6^{3-}$

$C_6N_6Fe^{3-}$ Hexacyanoferrate (III) ion L^{3-}

Metal ion	Equilibrium	Log K 25°, 0.5	Log K 25°, 1.0	Log K 25°, 0	ΔH 25°, 0	ΔS 25°, 0
Na^+	ML/M.L		-0.3[e]			
K^+	ML/M.L	-0.24	0.18[d]	1.43 ±0.03	0.5	8
		0.85[a]	0.30[e]			
Cs^+	ML/M.L		0.52[e]			
Mg^{2+}	ML/M.L		0.04[e]	2.79		
Ca^{2+}	ML/M.L		0.15[e]	2.83 -0.2	1.6[a]	18
Sr^{2+}	ML/M.L		0.23[e]	2.85		
Ba^{2+}	ML/M.L			2.88		
La^{3+}	ML/M.L			3.74 ±0.00	0.9 +1	20
Pr^{3+}	ML/M.L			3.6	0.9	19
Nd^{3+}	ML/M.L			3.74	0.8	20
Sm^{3+}	ML/M.L			3.7	0.9	20
Eu^{3+}	ML/M.L			3.7	1.0	20
Gd^{3+}	ML/M.L			3.74	1.0	20
Tb^{3+}	ML/M.L			3.8	0.9	20
Dy^{3+}	ML/M.L			3.7	1.0	20
Ho^{3+}	ML/M.L			3.7	1.1	20
Er^{3+}	ML/M.L			3.7	1.0	20
Tm^{3+}	ML/M.L			3.7	1.1	20
Yb^{3+}	ML/M.L			3.7	1.0	20
Lu^{3+}	ML/M.L			3.7	1.0	20
Fe^{3+}	ML/M.L	1.55 ±0.01	1.32			

[a] 25°, 0.1; [d] 25°, 2.0; [e] 25°, 3.0

Hexacyanoferrate (III) ion continued)

Bibliography:

Na^+,Cs^+ 67RM

K^+ 49M,66CL,67EG,67RM

Mg^{2+}-Ba^{2+} 52GMa,67RM,74HI

La^{3+}-Lu^{3+} 48DJ,51DJ,63DK,72SC

Fe^{3+} 51ID,67SSb

Other references: 45D,50JMb,53BP,59GR, 61PF,62BBa,62JE,63LM,63HPS,65LW,66MR

$Co(CN)_6^{3-}$

$C_6N_6Co^{3-}$ Hexacyanocobaltate (III) ion L^{3-}

Metal ion	Equilibrium	Log K 20°, 0.1	Log K 25°, 0	ΔH 25°, 0	ΔS 25°, 0
K^+	ML/M.L		1.22	2	12
La^{3+}	ML/M.L		3.75 ±0.02	1.3	22
Ag^+	$M^3.L/M_3L(s)$		-25.41		
Hg_2^{2+}	$M^3.L^2/M_3L_2(s)$		-36.72		
CH_3Hg^+	ML/M.L	4.15			
	$M_2L/ML.M$	3.50			
Cd^{2+}	ML/M.L		4.17		

Bibliography:

K^+ 50JMb

La^{3+} 50JMb,60M,63DK

Ag^+,Hg_2^{2+} 65R

CH_3Hg^+ 65SS

Cd^{2+} 64RSS

Other references: 59DT,60A,62AY

$B(OH)_3$

H_3O_3B Hydrogen borate (boric acid) HL

Metal ion	Equilibrium	Log K 25°, 0.5	Log K 25°, 1.0	Log K 25°, 0	ΔH 25°, 0	ΔS 25°, 0
H^+	HL/H.L	8.97[a]±0.02	8.85[r]	9.236 ±0.001	-3.4 ±0.0	31
		8.94[d]±0.07	8.97[e]		-3.9[d]	
	$B_3O_3(OH)_4/H^2.L^3$	19.62[a]	20.07[e]			
	$B_3O_3(OH)_5/H.L^3$		10.4[e]			
	$B_4O_5(OH)_4/H^2.L^4$		20.9[e]			
	$B_5O_6(OH)_4/H^4.L^5$	38.1[a]	38.2[e]			
Ag^+	ML/M.L		0.45[e]			
	$M.(HL)^2/H.MHL_2(s)$		4.5[e]			

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[a] 25°, 0.1; [d] 25°, 2.0; [e] 25°, 3.0; [r] 25°, 0.7

Bibliography:

H^+ 340,350,430K,44MD,57Ab,62I,63I,67Bb, 73BR,73DH

Ag^+ 70HS

Other references: OOWC,07L,09L,20K,22M, 24PW,27KB,30HK,30HKa,31FA,32BR,34BY, 38T,49KL,51Sb,53Ea,55L,57Ac,57La, 59D,59Sd,61Sb,61SB,63FU,63Sa,65Se, 66KG,67MN,68GL,72MBS,74BM

HCN

CHN Hydrogen cyanide (hydrocyanic acid) HL

Metal ion	Equilibrium	Log K 25°, 0.5	Log K 25°, 1.0	Log K 25°, 0	ΔH 25°, 0	ΔS 25°, 0
H^+	HL/H.L	9.01[a]	8.95	9.21 ±0.01	-10.43	7.2
		9.14[h]	9.48[e]		10.9[h]	5[a]
					-9.57[r]	
Fe^{2+}	$ML_6/M.L^6$			35.4	-85.8	-126
Co^{2+}	$ML_5/M.L^5$				-61.5	
	$MHL_5/ML_5.H$				-32.0	
Ni^{2+}	ML/M.L		7.03[e]			
	$ML_4/M.L^4$	30.5[a]	31.06[e]	30.22 ±0.1	-43.2	-7
	$MHL_4/ML_4.H$	5.4[a]				
	$MH_2L_4/MHL_4.H$	4.5[a]				
	$MH_3L_4/MH_2L_4.H$	2.6[a]				
Fe^{3+}	$ML_6/M.L^6$			43.6	-70.1	-36
Cu^+	$ML_2/M.L^2$			16.26	-29.1	-23
	$ML_3/M.L^3$			21.6 ±0.1	-40.2	-36
	$ML_4/M.L^4$			23.1	-51.4	-67
Ag^+	$ML_2/M.L^2$		20.0	20.48	-32.9	-17
	$ML_3/M.L^3$		20.3[s]	21.4	-33.5	-13
	$ML_4/M.L^4$		20.8[s]			
	MOHL/M.OH.L		12.7	13.2		
	M.L/ML(s)		-15.4	-15.66		
Hg_2^{2+}	$M.L^2/ML_2(s)$			-39.3		
CH_3Hg^+	ML/M.L	13.8[a]			-22.1[h]	-11[a]
Pd^{2+}	$ML_4/M.L^4$			42.4	-92.3	-116
	$ML_5/M.L^5$			45.3	-92.5	-103
Zn^{2+}	ML/M.L		5.3[e]			
	$ML_2/M.L^2$		11.7[e]	11.07	-11.0	14
	$ML_3/M.L^3$		16.7[e]	16.05	-20.2	7
	$ML_4/M.L^4$		21.6[e]	19.62	-27.9	-3
	$M.L^2/ML_2(s)$		-15.5[e]			

[a] 25°, 0.1; [e] 25°, 3.0; [h] 20°, 0.1; [r] 40°, 0; [s] 30°, 1.0

Hydrogen cyanide (continued)

Metal ion	Equilibrium	Log K 25°, 0.5	Log K 25°, 1.0	Log K 25°, 0	ΔH 25°, 0	ΔS 25°, 0
Cd^{2+}	ML/M.L			6.01	-7.3	3
			5.55[e]±0.07		-7.4[e]	1[e]
	$ML_2/M.L^2$			11.12	-13.0	7
			10.7[e] ±0.1		-15.1[e]	-2[e]
	$ML_3/M.L^3$			15.65	-21.6	-1
			15.5[e] ±0.3		-22.2[e]	-4[e]
	$ML_4/M.L^4$			17.92	-26.7	-8
			19.0[e] ±0.2		-29.3[e]	-11[e]
Hg^{2+}	ML/M.L	18.00[h]		17.00	-23.2	0
	$ML_2/M.L^2$	34.71[h]	33.9[t]	32.75	-46.6	-6
	$ML_3/M.L^3$	38.54[h]	38.1[t]	36.31	-53.4	-13
	$ML_4/M.L^4$	41.5[h]	40.6[t]	38.97	-59.7	-22
	MOHL/M.OH.L		28.9[t]			

[e] 25°, 3.0; [h] 20°, 0.1; [t] 30°, 2.0

Bibliography:

H^+ 57A,59Ab,62IC,65SS,66BK,70CJ,71P

Fe^{2+},Fe^{3+} 65WC

Co^{2+} 68IW

Ni^{2+} 59FSa,63CI,68KM,71IJ,71PH,74P

Cu^+ 67IJ,71PK,74KH

Ag^+ 56KSa,65ZP,67AD,67IJ,72GC

Hg_2^{2+} 29B

CH_3Hg^+ 65SS

Pd^{2+} 67IW

Zn^{2+} 65IC,71IJ,71P

Cd^{2+} 44L,66Gb,71IJ,71P

Hg^{2+} 57A,58NC,59NH,65CI,71IJ

Other references: 00M,00T,00WC,25HW,30RH, 31BDa,32Br,47R,50H,50VK,53S,54W,55F, 56N,56PJ,56SM,57TM,58SWa,60MJ,61Mb, 61MB,63AS,63PB,64GH,64VHa,65FK,67BP, 67ZF,68AD,68EP,69KH,71DG,72CD,72HF, 72P,74Kc

HNCO

CHON Hydrogen cyanate (cyanic acid) HL

Metal ion	Equilibrium	Log K 27°, 1.5	Log K 25°, 0	ΔH 25°, 0	ΔS 25°, 0
H^+	HL/H.L		3.48 ±0.02	-2.0	9
Co^{2+}	$ML_4/M.L^4$	2.67			
Ag^+	$ML_2/M.L^2$		5.00[r]		
	M.L/ML(s)		-6.64[s]		

[r] 30°, 0; [s] 19°, 0

Bibliography:

H^+ 58C,58J,58M

Co^{2+} 66CV

Ag^+ 30BH,54C

Other references: 56Aa,66BK

HNCS

CHNS Hydrogen thiocyanate (thiocyanic acid) HL

Metal ion	Equilibrium	Log K 25°, 0.5	Log K 25°, 1.0	Log K 25°, 0	ΔH 25°, 0	ΔS 25°, 0
H^{+}	HL/H.L			0.9 ±0.1		
Be^{2+}	ML/M.L			-0.16[f]		
	$ML_2/M.L^2$			-0.6[f]		
Mg^{2+}	ML/M.L		-0.9[e]			
Sc^{3+}	ML/M.L	0.20[i]		0.8[m]		
Y^{3+}	ML/M.L	(-0.07)[i]				
La^{3+}	ML/M.L		0.12[r]	0.24[g]		
Ce^{3+}	ML/M.L			0.59[g]		
Sm^{3+}	ML/M.L	0.09[i]				
Eu^{3+}	ML/M.L		0.15[r]	0.7		
				0.38[g]±0.06	(1)[s]	(5)[g]
Gd^{3+}	ML/M.L	0.21[i]				
Tb^{3+}	ML/M.L		0.23[r]			
Dy^{3+}	ML/M.L	0.12[i]				
Er^{3+}	ML/M.L	0.16[i]				
Lu^{3+}	ML/M.L		0.20[r]	0.45[g]		
Ac^{3+}	ML/M.L		0.05			
Pu^{3+}	ML/M.L		0.46			
Am^{3+}	ML/M.L		0.43 ±0.07	0.59[g]±0.2	(3)[s]	(12)[g]
Cm^{3+}	ML/M.L		0.44 ±0.01	0.61[g]	(3)[s]	(12)[g]
Bk^{3+}	ML/M.L		0.49	(0.86)[g]	(1)[s]	(6)[g]
Cf^{3+}	ML/M.L		0.57			
Es^{3+}	ML/M.L		0.56			
Th^{4+}	ML/M.L		1.08			
	$ML_2/M.L^2$		1.78			

[e] 25°, 3.0; [f] 25°, 4.0; [g] 25°, 4.0; [i] 20°, 0.6; [m] 20°, 4.0; [r] 30°, 1.0; [s] 10-55°, 5.0

Hydrogen thiocyanate (continued)

Metal ion	Equilibrium	Log K 25°, 0.5	Log K 25°, 1.0	Log K 25°, 0	ΔH 25°, 0	ΔS 25°, 0
U^{4+}	ML/M.L	1.49[d]	1.49[j]		(-6)[t]	(-13)[d]
	$ML_2/M.L^2$	2.11[d]	1.95[j]		(-8)[t]	(-17)[d]
	$ML_3/M.L^3$		2.2[j]			
UO_2^{2+}	ML/M.L		0.75	0.93	-0.8[c]	1[c]
			0.72[u]	0.71[f]		
	$ML_2/M.L^2$		0.72		-2.1[c]	-4[c]
			0.70[u]	0.72[f]		
	$ML_3/M.L^3$		0.18		-1.4[c]	0[c]
V^{2+}	ML/M.L		1.43		(-5)[v]	(-10)[c]
Cr^{2+}	ML/M.L			1.09		
	$ML_2/M.L^2$			0.77		
Mn^{2+}	ML/M.L	0.80	0.65	1.23	-0.9	3
		1.30[k]				
Fe^{2+}	ML/M.L		0.81[e]	1.31		
Co^{2+}	ML/M.L	1.11 ±0.04	0.98 ±0.03	1.72 -0.2	-1.6	3
			1.27[e]			
	$ML_2/M.L^2$		1.32			
Ni^{2+}	ML/M.L	1.23 ±0.02	1.13 ±0.01	1.76 -0.09	-2.3	0
			1.34[e]		-2.9[c]	-4[c]
	$ML_2/M.L^2$		1.58 -0.01		-5.0[c]	-10[c]
	$ML_3/M.L^3$		1.5 ±0.2		-7[c]	-16[c]
Cu^{2+}	ML/M.L	1.90[a]	1.74 +0.02	2.33	-3.0	1
			1.91[e]		-3.0[c]	-2[c]
	$ML_2/M.L^2$	3.00[a]	2.74	3.65	-3.1[c]	2[c]
V^{3+}	ML/M.L		2.13 ±0.06		(-4)[w]	(-4)[c]
Cr^{3+}	ML/M.L		(1.87)	3.08	(-2)[x]	(7)
	$ML_2/M.L^2$		(2.98)			

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[a] 25°, 0.1; [c] 25°, 1.0; [d] 25°, 2.0; [e] 25°, 3.0; [f] 23°, 4.0; [j] 20°, 1.0; [k] 20°, 1.5; [t] 10-40°, 2.0; [u] 23°, 2.5; [v] 11-45°, 0.8; [w] 5-37°, 1.0; [x] 10-40°, 0

Hydrogen thiocyanate (continued)

Metal ion	Equilibrium	Log K 25°, 0.5	Log K 25°, 1.0	Log K 25°, 0	ΔH 25°, 0	ΔS 25°, 0
Fe^{3+}	ML/M.L	2.14 ±0.03	2.10 ±0.03	3.02 ±0.01	-1.3[c]	5[c]
			2.21[e] ±0.03		-0.6[d]	
	$ML_2/M.L^2$	3.3 ±0.2	3.2 ±0.1	4.64[n]		
			3.64[e] ±0.04			
	$ML_3/M.L^3$		5.0[e]			
	$ML_4/M.L^4$		6.3[e]			
	$ML_5/M.L^5$		6.2[e]			
	$ML_6/M.L^6$		6.1[e]			
VO^{2+}	ML/M.L	0.92		3.32	(-4)[x]	(-4)
	$ML_2/M.L^2$			3.68	(-1)[x]	(14)
Pd^{2+}	$ML_4/M.L^4$		27.2 ±1			
Cu^{+}	$ML_2/M.L^2$			11.00[g]		
	$ML_3/M.L^3$			10.9[g]		
	$ML_4/M.L^4$			10.4[g]		
	M.L/ML(s)			-13.40[g]		
Ag^{+}	ML/M.L	4.6[a]		4.8		
				4.6[f]		
	$ML_2/M.L^2$	8.06[a]		8.23		
		8.18[d]		8.29[f]		
	$ML_3/M.L^3$	9.6[a]		9.5		
		9.3[d]		10.0[f]		
	$ML_4/M.L^4$	10.5[a]		9.7		
		10.0[d]		11.3[f]		
	M.L/M.(s)	-11.80[a]		-11.97 ±0.03	22.6	21
Au^{+}	ML/M.L		15.27[e]			
	$ML_2/M.L^2$		16.98[e]			
Hg_2^{2+}	$M.L^2/ML_2(s)$		-19.00	-19.52		
CH_3Hg^{+}	ML/M.L	6.05[h]				
	$M_2L/ML.M$	1.65[h]				
$C_2H_5Hg^{+}$	$ML_2/ML.L$		-0.10			
	$ML_3/ML_2.L$		0.20			

[a] 25°, 0.1; [c] 25°, 1.0; [d] 25°, 2.0; [e] 25°, 3.0; [f] 25°, 4.0; [g] 25°, 5.0; [h] 20°, 0.1; [n] 18°, 0; [x] 10-40°, 0

Hydrogen thiocyanate (continued)

Metal ion	Equilibrium	Log K 25°, 0.5	Log K 25°, 1.0	Log K 25°, 0	ΔH 25°, 0	ΔS 25°, 0
Tl^{+}	ML/M.L	0.24	0.17	0.58		
		0.12[d]	0.15[e]±0.05	0.17[f]±0.03		
	$ML_2/M.L^2$	0.00	-0.05			
		-0.12[d]	-0.12[e]±0.08	-0.03[f]±0.03		
	$ML_3/M.L^3$		-0.4			
		-0.5[d]	-0.5[e] ±0.1	-0.5[f] ±0.1		
	M.L/ML(s)			-3.79 ±0.02		
				-3.16[f]		
Zn^{2+}	ML/M.L		0.71	1.33	-1.4[c]	-1[c]
		0.74[d]		1.11[f]		
	$ML_2/M.L^2$		1.04	1.91	-1.8[c]	-1[c]
		1.15[d]		1.81[f]		
	$ML_3/M.L^3$		1.2	2.0	-2[c]	-1[c]
		1.3[d]		2.8[f]		
	$ML_4/M.L^4$		1.5	1.6	-4[c]	-6[c]
		1.7[d]		2.8[f]		
Cd^{2+}	ML/M.L	1.35 -0.02	1.32 ±0.02	1.89	-2.3[c]	-2[c]
		1.53[a]				
		1.34[d]	1.41[e]-0.05		-1.9[e]	0[e]
	$ML_2/M.L^2$	2.04	1.99	2.78	-4.2[c]	-5[c]
		2.05[d]	2.24[e]-0.2		-3.7[e]	-2[e]
	$ML_3/M.L^3$	2.1	2.0	2.8	-6[c]	-12[c]
		2.2[d]	2.5[e] ±0.1		-5.2[e]	-6[e]
	$ML_4/M.L^4$	2.0	1.9	2.3		
		2.0[d]	2.5[e] ±0.0		-6.2[e]	-10[e]
Hg^{2+}	ML/M.L		9.08		-11.9[c]	2[c]
	$ML_2/M.L^2$	16.43[a]	16.86	17.26	-24.0[c]	-3[c]
	$ML_3/M.L^3$	19.14[a]	19.70	19.97	-29.0[c]	-7[c]
	$ML_4/M.L^4$	21.2[a] ±0.1	21.7	21.8 ±0.1	-34.4[c]±0.4	-16[c]
	$M.L^2/ML_2(s)$		-19.56			
Sn^{2+}	ML/M.L	1.17[k]				
	$ML_2/M.L^2$	1.77[k]				
	$ML_3/M.L^3$	1.74[k]				

[a] 25°, 0.1; [c] 25°, 1.0; [d] 25°, 2.0; [e] 25°, 3.0; [f] 25°, 4.0; [k] 20°, 2.2

Hydrogen thiocyanate (continued)

Metal ion	Equilibrium	Log K 25°, 0.5	Log K 25°, 1.0	Log K 25°, 0	ΔH 25°, 0	ΔS 25°, 0
$(CH_3)_2Sn^{2+}$	ML/M.L		0.43			
	$ML_2/M.L^2$		1.0			
Pb^{2+}	ML/M.L	0.54[d]	0.78[e]	1.08[f]	0.3	3[d]
	$ML_2/M.L^2$	0.87[d]	0.99[e]	1.48[f]		
	$ML_3/M.L^3$		1.0[e]			
Al^{3+}	ML/M.L			0.42[o]		
Ga^{3+}	ML/M.L	1.18[i]		2.15[y]		
In^{3+}	ML/M.L	2.34[i]		3.15[y]		
		2.56[d]			-1.7[d]	6[d]
	$ML_2/M.L^2$	3.53[d]			-5.5[d]	-2[d]
	$ML_3/M.L^3$	4.6[d]			-3.1[d]	11[d]
CH_3Sn^{3+}	ML/M.L		1.48			
	$ML_2/M.L^2$		2.20			
	$ML_3/M.L^3$		3.3			
Bi^{3+}	ML/M.L	1.67[a]	1.32	2.21		
			(1.28)[e]	2.02[f]		
	$ML_2/M.L^2$	3.0[a]	2.1	2.7		
			2.7[e]	3.5[f]		
	$ML_3/M.L^3$	4.0[a]	3.0	4.4		
			3.8[e]	4.8[f]		
	$ML_4/M.L^4$	4.8[a]	(2.9)	5.2		
			5.3[e]	6.3[f]		
	$ML_5/M.L^5$	5.5[a]	3.6	5.8		
			6.0[e]	6.8[f]		
	$ML_6/M.L^6$	6.1[a]	4.0	5.4		
			6.9[e]	8.3[f]		

[a] 25°, 0.1; [c] 25°, 1.0; [d] 25°, 2.0; [e] 25°, 3.0; [f] 25°, 4.0; [k] 20°, 2.2; [y] 30°, 0

Bibliography:

H^+ 42SH,66BK

Be^{2+} 71SK

Mg^{2+} 73HHa

Sc^{3+} 64KS,67KG

Y^{3+}-Lu^{3+} 64B,64KS,65Sc,74KC,74KM

Ac^{3+} 68RS

Pu^{3+}-Es^{3+} 65CK,65Sc,72HPa,74KC

Th^{4+} 50WS

Hydrogen thiocyanate (continued)

U^{4+}	54AL,55DW
UO_2^{2+}	49Aa,57DM,64VM,71AKa
V^{2+}	68MSa,68OP
Cr^{2+}	58YF
Mn^{2+}	58YK,63TC,64TCa,67NT,73HH
Fe^{2+}	58YK,67CS
Co^{2+}	51SS,58SP,58YK,62TZ,62W,63TC,64KS, 67NT,70MM,71SM,73HH
Ni^{2+}	58YK,62W,63TC,67NT,68MT,70MM,73HH, 74K
Cu^{2+}	59TT,62W,67NT,70MM,73HH,74K
V^{3+}	51FG,67BSW,68KT
Cr^{3+}	54PB,55PK
Fe^{3+}	51MM,51SS,53BD,55LR,56L,57YT,58BCC, 58P,61Y,64KS,65MR,67CS,68Ma,68PC,69VM
VO^{2+}	51FG,68SW
Cu^{+}	59FS
Ag^{+}	12K,54KT,54LN,55LN,56VS
Au^{+}	66K
Hg_2^{2+}	29B,70CG
CH_3Hg^{+}	65SS
$C_2H_5Hg^{+}$	65BB
Tl^{+}	52Sb,57N,58BC,58PD,60KM,62KC,65KM, 66OL,71FR
Pd^{2+}	63GKG,65FK,66BSA
Zn^{2+}	66MK,70DSa,71AKb,73RS
Cd^{2+}	41L,57TH,63TC,64KS,66Gb,68G,68GJa, 73HH,73RS
Hg^{2+}	56T,62TE,70CG,71AKb,74Kb
Sn^{2+}	61GO
$(CH_3)_2Sn^{2+}$,CH_3Sn^{3+}	68PC
Pb^{2+}	56LS,59TH,63MKT,67NT
Al^{3+}	63VM
Ga^{3+}	64KS,68DD
In^{3+}	54Sa,64KS,68DD,69R
Bi^{3}	71FKa

Other references: 26B,49KH,51HDC,52AP, 52YV,53BG,53CH,53FH,53J,56LS,56Ta, 57GS,57I,57TS,57YT,58HT,58PD,58SW, 60NA,61BT,61GS,61MD,61SN,62LY,62S, 62Va,63RS,64K,64VM,65HS,65MSW,65NH, 66CM,66SD,66VV,68P,69SMT,69SS,70FS, 70SGK,71BSB,71DD,71KN,71MO,71MS,71PT, 72HPB,72L,73CDa,73RT,74RB,74TM

$NCSe^-$

$CNSe^-$ Selenocyanate ion L^-

Metal ion	Equilibrium	Log K 25°, 0.3	Log K 25°, 1.0	Log K 19°, 0	ΔH 25°, 1.0	ΔS 25°, 1.0
Ni^{2+}	ML/M.L		0.99		-3.1	-6
	$ML_2/M.L^2$		1.26		-6	-14
Ag^+	$ML_3/M.L^3$	13.90				
	M.L/ML(s)			-15.40		
Zn^{2+}	ML/M.L		0.44		-1.4	-3
	$ML_2/M.L^2$		0.64		(-1.5)	(-2)
Cd^{2+}	ML/M.L		1.47		-2.4	-1
	$ML_2/M.L^2$		2.30		-6.3	-11
	$ML_3/M.L^3$		2.8		(-1)	(9)
	$ML_4/M.L^4$		4.04		-10	-15
Hg^{2+}	$ML_3/M.L^3$	26.4				
	$ML_4/M.L^4$	28.9	28.7[r]		-46.1	-23[r]

[r] 25°, 0.8

Bibliography:

Ni^{2+} 74Ka

Ag^+ 30BH,56T

Hg^{2+} 56T,74Kb

Zn^{2+},Cd^{2+} 74AA

Other references: 59G,59GK,60GSa,60LC, 61GSa,61GSb,62GA,66BK,67HB,72MT,73RT

$C(CN)_3^-$

$C_4N_3^-$ Tricyanomethane ion L^-

Metal ion	Equilibrium	Log K 19°, 0
Ag^+	M.L/ML(s)	-8.34

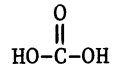
Bibliography: 30BH

$N(CN_2)^-$

$C_2N_3^-$ Dicyanimide ion L^-

Metal ion	Equilibrium	Log K 19°, 0
Ag^+	M.L/ML(s)	-8.85

Bibliography: 30BH



CH_2O_3 Hydrogen carbonate (carbonic acid) H_2L

Metal ion	Equilibrium	Log K 25°, 0.5	Log K 25°, 1.0	Log K 25°, 0	ΔH 25°, 0	ΔS 25°, 0
H^+	HL/H.L	10.00[a]	9.57	10.329±0.01	-3.5 -0.1	36
			9.56[e]			
	H_2L/HL.H	6.16[a]	6.02 ±0.03	6.352+0.01	-2.0 ±0.1	22
		5.97[d]	6.33[e]			
	$H_2L/CO_2(g)$		-1.51	-1.464±0.01		
			-1.55[e]			
Mg^{2+}	ML/M.L	(2.37)[r]		2.88	(3)[s]	(20)
	MHL/M.HL	0.77[r]		0.95		
	$M.L/ML(H_2O)_5(s)$			-4.54		
	$M.L/ML(H_2O)_3(s)$			-4.67		
	M.L/ML(s)			-7.46	(5)[t]	(-20)
Ca^{2+}	ML/M.L	3.00[r]		3.15 ±0.05	(4)[s]	(30)
	MHL/M.HL	0.81[r]		1.0 ±0.0		
	M.L/ML(s,calcite)	-8.01[r]		-8.35 ±0.1	(2)[u]	(-30)
	M.L/ML(s,aragonite)			-8.22		
Sr^{2+}	M.L/ML(s)			-9.03		
Ba^{2+}	ML/M.L			2.78		
	M.L/ML(s)			-8.30 ±0.01		
Y^{3+}	$M^2.L^3/M_2L_3(s)$			-30.6		
La^{3+}	$M^2.L^3/M_2L_3(s)$			-33.4		
Nd^{3+}	$M^2.L^3/M_2L_3(s)$			-33.0		
Sm^{3+}	$M^2.L^3/M_2L_3(s)$			-32.5		
Gd^{3+}	$M^2.L^3/M_2L_3(s)$			-32.2		
Dy^{3+}	$M^2.L^3/M_2L_3(s)$			-31.5		
Yb^{3+}	$M^2.L^3/M_2L_3(s)$			-31.1		
Mn^{2+}	MHL/M.HL		0.45[e]	1.8		
	M.L/ML(s)		-9.68[e]	-9.30		
Fe^{2+}	M.L/ML(s)			-10.68		

[a] 25°, 0.1; [d] 25°, 2.0; [e] 25°, 3.0; [r] 22°, 0.15; [s] 10-50°, 0; [t] 25-40°, 0; [u] 0-70°, 0

Hydrogen carbonate (continued)

Metal ion	Equilibrium	Log K 25°, 0.5	Log K 25°, 1.0	Log K 25°, 0	ΔH 25°, 0	ΔS 25°, 0
Co^{2+}	M.L/ML(s)			-9.98		
Ni^{2+}	M.L/ML(s)			-6.87		
Cu^{2+}	ML/M.L			6.75 ±0.02		
	$ML_2/M.L^2$	8.6[v]		9.92 ±0.09		
	M.L/ML(s)			-9.63		
	$M.(OH)^2.L/M(OH)_2L(s)$			-15		
	$M^2.(OH)^2L.L/M_2(OH)_2L$(s,malachite)			-33.78		
	$M^3.(OH)^2.L^2/M_3(OH)_2L_2$(s,azurite)			-45.96		
Ag^+	$M^2.L/M_2L(s)$			-11.09		
Hg_2^{2+}	M.L/ML(s)			-16.05		
Zn^{2+}	M.L/ML(s)			-10.00		
Cd^{2+}	M.L/ML(s)			-13.74		
Pb^{2+}	$ML_2/M.L^2$	8.2[v]				
	M.L/ML(s)		-11.01	-13.13 -0.01		
	$(M(OH)_3)^3.L^2/(OH)^7.M_3(OH)_2L_2(s)$			-5.10		

[v] 18°, 1.7

Bibliography:

H^+ 14MR,25MM,28SH,35MB,35SM,35W,37P,38CH, 41HS,43HD,46N,57MS,58FN,58NR,59Ea,60GL, 61NM,71Nb,73DH,73MC

Mg^{2+} 41G,62H,63Ha,74RL

Ca^{2+} 29FJ,35HR,37BH,41G,46Na,62GT,68La,70Lb, 74JL,74RL

Sr^{2+} 35KA

Ba^{2+} 35KA,46Na,73BS

Y^{3+}-Yb^{3+} 66JH

Mn^{2+} 35KA,63H,70GK

Fe^{2+},Ni^{2+},Zn^{2+},Cd^{2+} 35KA

Co^{2+} 67B

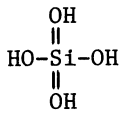
Cu^{2+} 35KA,58Sb,59FB,68SRG

Ag^+ 27WB

Hg_2^{2+} 29B

Pb^{2+} 28RS,35KA,59FB,61NM

Other references: 00Bc,03AC,07P,09SL,11AV, 13AP,14W,15J,17SL,22O,23M,26HB,29K, 30M,39HJ,42N,42Na,46KD,50M,51M,52Lb, 52Sf,55MB,56BC,57Sa,57Sb,57Sc,58LG, 58MG,58ML,58VG,59E,59Kb,59KS,59U, 60BG,60BK,60R,61GM,61GT,61PK,62GM, 62PNN,62SH,62WS,63E,63MG,63R,63SR, 64FD,65BBa,65GSS,66BT,67Ba,68B,68BB, 68Na,69Bc,69H,69NR,70HKS,71Na,72MV, 72OS



H_4O_4Si Hydrogen silicate (silicic acid) H_2L

Metal ion	Equilibrium	Log K 25°, 0.5	Log K 25°, 1.0	Log K 25°, 0	ΔH 25°, 0	ΔS 25°, 0
H^+	HL/H.L	12.56	12.71[e]	13.1	(-10)[r]	(24)[b]
	$H_2L/HL.H$	9.46 ±0.00	9.47	9.86	(-5)[r]	(27)[b]
			9.43[e]			
	$H_2L_2/H^2.L^2$		26.16[e]			
	$H_4L_4/H^4.L^4$		56.08[e]	55.9		
	$H_6L_4/H^6.L^4$	75.51		78.2	(-20)[r]	(280)[b]
	H_2L/SiO_2(s,amorphous)		-2.89	-2.74		
Mg^{2+}	ML/M.L		4.17			
	MHL/M.HL		0.64			
	$M(HL)_2/M.(HL)^2$		3.82			
	$M^2.(HL)^3/M_2(HL)_3(H_2O)_4$(s)			-38.8[u]		
Ca^{2+}	ML/M.L		3.09			
	MHL/M.HL		0.39			
	$M(HL)_2/M.(HL)^2$		2.89			
	M.L/ML(s)			-7.2		
UO_2^{2+}	MHL/M.HL	7.5[s]				
Fe^{3+}	MHL/M.HL	8.9[a] ±0.4			(4)[t]	(50)[a]

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[a] 25°, 0.1; [b] 25°, 0.5; [e] 25°, 3.0 molal; [r] 25-50°, 0.5; [s] 25°, 0.2; [t] 18-32°, 0.1; [u] 51, 0

Bibliography:

H^+ 57GP,58G,58SMa,59L,67BI,68J,74SS,76BM

Mg^{2+} 73CH,74SS

Ca^{2+} 65GC,74SS

UO_2^{2+} 71PW

Fe^{3+} 65WS,71PW,7300

Other references: 27H, 27H,28RL,30HK,34FW, 40RE,43OKa,54Ma,54AHI,57TK,58AK,60GC, 61KT,62FR,62MF,65Ac,67R,73PE

NH_3

H_3N Ammonia L

Metal ion	Equilibrium	Log K 25°, 0.5	Log K 25°, 1.0	Log K 25°, 0	ΔH 25°, 0	ΔS 25°, 0
H^+	HL/H.L	9.32 ±0.03	9.40 ±0.04	9.244±0.005	-12.45 ±0.05	0.5
		9.29[a]-0.01	9.49[d]±0.03	9.80[g]	-13.51[e]	
					-12.75[r]	
	HL/H.L(g)		11.11		(-11)[s]	(11)[c]
Li^+	ML/M.L	-0.3[t]				
Mg^{2+}	ML/M.L	0.23[t]				
	$ML_2/M.L^2$	0.08[t]		0.2	-1.2	-3
	$ML_3/M.L^3$	-0.3[t]				
Ca^{2+}	ML/M.L	-0.2[t]				
	$ML_2/M.L^2$	-0.8[t]				
Mn^{2+}	ML/M.L	1.00[k]				
	$ML_2/M.L^2$	1.54[k]				
	$ML_3/M.L^3$	1.70[k]				
	$ML_4/M.L^4$	1.3[k]				
Co^{2+}	ML/M.L	2.10[u]±0.02		1.99[o]	-3.2[v]	-1[u]
	$ML_2/M.L^2$	3.67[u]±0.07		3.50[o]		
	$ML_3/M.L^3$	4.78[u]±0.01		4.43[o]		
	$ML_4/M.L^4$	5.53[u]±0.02		5.07[o]		
	$ML_5/M.L^5$	5.75[u]±0.02		5.13[o]		
	$ML_6/M.L^6$	5.14[u]±0.03		4.39[o]		
Ni^{2+}	ML/M.L	2.81[d]±0.04		2.72	-4.0[d]±0.0	-1[d]
	$ML_2/M.L^2$	5.08[d]±0.06		4.89	-7.8[d]±0.2	-3[d]
	$ML_3/M.L^3$	6.85[d]±0.07		6.55	-12.1[d]+0.1	-9[d]
	$ML_4/M.L^4$	8.12[d]±0.05		7.67	-15.6[d]±0.4	-15[d]
	$ML_5/M.L^5$	8.93[d]±0.02		8.34	-19[d] ±1	-22[d]
	$ML_6/M.L^6$	9.08[d]±0.04		8.31	-24[d] ±1	-39[d]

[a] 25°, 0.1; [c] 25°, 1.0; [d] 25°, 2.0; [e] 25°, 3.0; [g] 25°, 5.0; [k] 20°, 2.0; [o] 20°, 0; [r] 40°, 0; [s] 25-40°, 1.0; [t] 23°, 2.0; [u] 30°, 2.0; [v] 27°, 2.0

Ammonia (continued)

Metal ion	Equilibrium	Log K 25°, 0.5	Log K 25°, 1.0	Log K 25°, 0	ΔH 25°, 0	ΔS 25°, 0
Cu^{2+}	$ML/M.L$	4.24[d]±0.03	4.12 ±0.03	4.04 ±0.03	-5.5[d]±0.1	1[d]
	$ML_2/M.L^2$	7.83[d]±0.04	7.63 ±0.02	7.47	-11.1[d]+0.1	-1[d]
	$ML_3/M.L^3$	10.80[d]±0.07	10.51 ±0.03	10.27	-16.6[d]±0.1	-6[d]
	$ML_4/M.L^4$	13.00[d]±0.05	12.6 ±0.1	11.75	-22.0[d]±0.1	-14[d]
	$ML_5/M.L^5$	12.43[d]±0.04			-26[d] ±1	-30[d]
Co^{3+}	$ML_5/ML_4.L$	5.07[d]			(-1.5)	(18)[d]
	$ML_6/ML_5.L$	4.50[d]	4.33	4.15	-6.9	-3[d]
	$ML_6/M.L^6$	35.21[u]	34.36[w]			
Cu^{+}	$ML/M.L$	5.93[x]				
	$ML_2/M.L^2$	10.58[d]			(-16)[y]	(-5)[d]
Ag^{+}	$ML/M.L$	3.30		3.31 ±0.06	-4.9	-1
		3.26[d]	3.20[g]			
	$ML_2/M.L^2$		7.21	7.22 ±0.01	-13.4 ±0.1	-12
		7.20[d]	7.13[g]			
CH_3Hg^{+}	$ML/M.L$	7.25				
		7.60[h]				
Tl^{+}	$ML/M.L$	-0.9[t]				
Pd^{2+}	$ML/M.L$		9.6			
	$ML_2/M.L^2$		18.5			
	$ML_3/M.L^3$		26.0			
	$ML_4/M.L^4$		32.8			
Zn^{2+}	$ML/M.L$	2.38[d]±0.03	2.32	2.21	-2.6[v]	2[d]
	$ML_2/M.L^2$	4.88[d]±0.2	4.81	4.50	-5.7[v]	3[d]
	$ML_3/M.L^3$	7.43[d]-0.3	7.11	6.86	-9.6[v]	2[d]
	$ML_4/M.L^4$	9.65[d]±0.1	9.32	8.89	-14.8[v]	-6[d]
Cd^{2+}	$ML/M.L$	2.72[d]±0.03	2.62 -0.08	2.55	-3.5[v]	1[d]
	$ML_2/M.L^2$	4.90[d]±0.05	4.79 ±0.01	4.56	-7.0[v]	-1[d]
	$ML_3/M.L^3$	6.32[d]±0.00	6.16 ±0.08	5.90	-10.5[v]	-6[d]
	$ML_4/M.L^4$	7.38[d]±0.08	7.1 ±0.1	6.74	-14.0[v]	-13[d]
	$ML_5/M.L^5$	7.02[d]	6.9		-17.5[v]	-27[d]
	$ML_6/M.L^6$	5.41[d]			-21.0[v]	-46[d]

[d] 25°, 2.0; [g] 25°, 5.0; [h] 20°, 0.1; [t] 23°, 2.0; [u] 30°, 2.0; [v] 27°, 2.0; [w] 30°, 1.0; [x] 18°, 2.0; [y] 18-25°, 2.0

Ammonia (continued)

Metal ion	Equilibrium	Log K 25°, 0.5	Log K 25°, 1.0	Log K 25°, 0	ΔH 25°, 0	ΔS 25°, 0
Hg^{2+}	ML/M.L	8.8[t]				
	$ML_2/M.L^2$	17.4[d]	(17.8)		-24.7[v]	-3[d]
	$ML_3/M.L^3$	18.4[d]			-28.0[v]	-10[d]
	$ML_4/M.L^4$	(19.3)[a]				
		19.1[d]			-31.6[v]	-19[d]
Au(III)	$ML_4/ML_3.L$		10.3			
	$ML_4/MH_{-1}L_4.H$		7.48			

[a] 25°, 0.1; [d] 25°, 2.0; [t] 23°, 2.0; [v] 27°, 2.0

Bibliography:

H^+ 30HO,340a,37P,41B,49BP,50BL,50BP, 53Sd,54EL,57KD,65PSV,67KZ,68RJ,68VK, 69ES,72VK,73CP,74RO

Li^+-Ca^{2+} 41B,54W

Mn^{2+} 72KB

Co^{2+} 41B,58YM,66LM

Ni^{2+} 41B,43DV,57YMa,59Sb,66LM

Cu^{2+} 31B,32B,34B,41B,44B,44Na,53SPa,57YMa, 58E,59Sc,69ES,73CP

Co^{3+} 41B,49YP

Cu^+ 34B

Ag^+ 00BD,37SBP,41B,41DS,43VM,44KN,47N, 55Fa,66Ja

CH_3Hg^+ 65SS,74RO

Tl^+ 41B

Pd^{2+} 68RJ

Zn^{2+} 41B,53SPa,57YM,66LM,72BP

Cd^{2+} 41B,43L,43DV,53SP,57YM,58E,72BPa

Hg^{2+} 41B,57YM,62TR,64WD

Au^{3+} 74SB

Other references: 01B,02BF,03E,07K,07L, 10NK,20LL,24Ka,25B,25W,28J,30K,30RH, 33AT,33BW,33T,34LS,35BW,36C,36SE,38EW, 40SF,44C,49J,49SB,51KL,51S,52Fb,52YG, 53LK,53LU,53Ya,54L,54LP,55SG,57TSa, 58CPC,58L,59Pa,60MT,61F,61KY,61LP, 61ML,61Sa,61WL,62B,64SA,65FK,65MB, 65RP,66FL,66GC,66Mb,67FH,67HL,67LK, 68GS,68QM,69BL,70GH,70GHa,70La,70MA, 71SS,73LG,73SB,74FS

H_2NNH_2

H_4N_2 **Hydrazine** L

Metal ion	Equilibrium	Log K 25°, 0.5	Log K 25°, 1.0	Log K 25°, 0	ΔH 18°, ~0	ΔS 25°, 0
H^+	HL/H.L	8.06 ±0.02	8.18	7.98 ±0.01	-9.7	4
		8.48[d]				
	H_2L/HL.H			-0.9[o]		
Co^{2+}	ML/M.L		1.57			
	$ML_2/M.L^2$		2.15			
	$ML_3/M.L^3$		3.09			
Ni^{2+}	ML/M.L	2.76[i]				
	$ML_2/M.L^2$	5.20[i]				
	$ML_3/M.L^3$	7.35[i]				
	$ML_4/M.L^4$	9.20[i]				
	$ML_5/M.L^5$	10.75[i]				
	$ML_6/M.L^6$	11.99[i]				
Zn^{2+}	ML/M.L	2.4[i]				
	$ML_2/M.L^2$	4.2[i]				
	$ML_3/M.L^3$	5.5[i]				

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[d] 25°, 2.3; [i] 20°, 0.5 $N_2H_5BF_4$; [o] 20°, 0

Bibliography:

H^+ 00Ba,36S,36WS,67SL,70AB,73KN,74KN

Co^{2+} 73SS

Ni^{2+},Zn^{2+} 52SZ

Other references: 00Bb,28H,29G,41Y,53RL, 54R,54Sd,67BS,72AG,72AK

$HONH_2$

H_3ON Hydroxylamine L

Metal ion	Equilibrium	Log K 25°, 0.5	Log K 25°, 1.0	Log K 25°, 0	ΔH 25°, 0	ΔS 25°, 0
H^+	HL/H.L	6.00	6.06	5.96 ±0.02	-9.3 +0.1	-4
		6.21[d]				
Mn^{2+}	ML/M.L	0.53[i]				
Co^{2+}	ML/M.L	0.93[i]				
Ni^{2+}	ML/M.L	1.47[i]				
Cu^{2+}	ML/M.L	2.42[i]				
	$ML_2/M.L^2$	4.1[i]				
VO_2^+	ML/M.L		1.10			
Ag^+	ML/M.L	1.85[i]				
Zn^{2+}	ML/M.L	0.48[i]	0.40			
	$ML_2/M.L^2$		1.01			

[d] 25°, 2.2; [i] 20°, 0.5

Bibliography:

H^+ 00B,00T,27Oa,41H,61RB,63S,65LL

Mn^{2+}-Cu^{2+},Ag^+ 63S

VO_2^+ 73B

Zn^{2+} 55N, 63S

Other references: 01W,40IA,57MR,57MRH, 61Kb,65Fa,66FPS,66GS,68JD,68S,74IS

HN_3

HN_3 Hydrogen azide (hydrazoic acid) HL

Metal ion	Equilibrium	Log K 25°, 0.5	Log K 25°, 1.0	Log K 25°, 0	ΔH 25°, 0	ΔS 25°, 0
H^+	HL/H.L	4.38	4.44 ±0.00	4.65 ±0.02	-3.6	9
		4.45[a]	4.78[e]	4.99[f]	-3.1[c]	10[c]
	HL/HL(g)			1.08		
Co^{2+}	ML/M.L		0.72			
Ni^{2+}	ML/M.L		0.86 ±0.02		-0.2[c]	3[c]
			1.04[e]			
	$ML_2/M.L^2$		1.3		-1.0[c]	2[c]
	$ML_3/M.L^3$		1.3		-3.5[c]	-6[c]
Cu^{2+}	ML/M.L	2.44[h]		2.86[o]		
				2.56[f]		
	$ML_2/M.L^2$			4.48[f]		
	$ML_3/M.L^3$			6.11[f]		
	$ML_4/M.L^4$			7.82[f]-0.01		
	$M.L^2/ML_2(s)$				3.6	
Fe^{3+}	ML/M.L	4.49[a]±0.07	4.20 ±0.1	4.85 ±0.04	(-2)[r]	(16)
Cu^+	$ML_3/M.L^3$			7.76[f]		
	M.L/ML(s)			-8.31		
Ag^+	ML/M.L			2.49[f]		
	$ML_2/M.L^2$			4.2[f]		
	$ML_3/M.L^3$			4.2[f]		
	$ML_4/M.L^4$			3.7[f]		
	M.L/ML(s)			-8.56 ±0.02	16.7	20
				-8.80[f]		
Hg_2^{2+}	$M.L^2/ML_2(s)$			-9.15	29.9	58
Tl^+	ML/M.L			0.39	-1.3	-3
	M.L/ML(s)			-3.66	11.1	21
Zn^{2+}	ML/M.L	0.78[d]	0.76		0.6[c]	6[c]
	$ML_2/M.L^2$	1.34[d]	1.3		1.2[c]	10[c]
	$ML_3/M.L^3$	2.3[d]	2.2		3.0[c]	20[c]
	$ML_4/M.L^4$	2.9[d]	2.4		-1.8[c]	5[c]

[a] 25°, 0.1; [c] 25°, 1.0; [d] 25°, 2.0; [e] 25°, 3.0; [f] 25°, 4.0; [h] 20°, 0.1; [o] 20°, 0; [r] 20-58°, 0

Hydrogen azide (continued)

Metal ion	Equilibrium	Log K 25°, 0.5	Log K 25°, 1.0	Log K 25°, 0	ΔH 25°, 0	ΔS 25°, 0
Cd^{2+}	ML/M.L	1.4[d]	1.61[e]		-1.2[e]	3[e]
	$ML_2/M.L^2$	2.6[d]	2.78[e]		-2.6[e]	4[e]
	$ML_3/M.L^3$	2.9[d]	3.2[e]		-4.3[e]	0[e]
	$ML_4/M.L^4$	3.0[d]	3.9[e]		-5.6[e]	-1[e]
Hg^{2+}	ML/M.L	7.42[a]	6.98	7.80	-7.3[c]	8[c]
	$ML_2/M.L^2$	14.63[a]	14.39	15.36	-16.1[c]	12[c]
Pd^{2+}	$M.L^2/ML_2(s,\alpha)$			-8.57 ±0.03	15.9	14
Tl^{3+}	ML/M.L	3.00[k]			(-2)[s]	(7)[k]
	$ML_2/M.L^2$	5.38[k]			(-5)[s]	(8)[k]
	$ML_3/M.L^3$	6.90[k]			(-13)[s]	(-12)[k]

[a] 25°, 0.1; [c] 25°, 1.0; [d] 25°, 2.0; [e] 25°, 3.0; [k] 20°, 2.0; [s] 13-50°, 2.0

Bibliography:

H^+ 41Ya,56GW,59BC,61BD,63DW,66BK,67MR, 72NS,76AA,
Co^{2+} 70SG
Ni^{2+} 67MRa,70SG,76AA
Cu^{2+} 56GW,58SO,71N,72NS,72SN
Fe^{3+} 61BD,61WD,65MK,67CE,76AA
Cu^+ 53Sb,72SN
Ag^+ 38TN,52Sa,54LS,56GW
Hg_2^{2+} 52Sc,56GW
Tl^+ 52Sa,56GW,57NN
Zn^{2+} 70DSa,76AA
Cd^{2+} 43L,61SN,66Gb,76AA
Hg^{2+} 65MK,76AA
Pb^{2+} 52Sc,54FS,56GW
Tl^{3+} 65V
Other references: 00H,00W,160,28H,32BR,40Q, 57BPa,59ES,61NP,61SA,62BS,68DS,73AA, 74Pb

HNO_2

HO_2N Hydrogen nitrite (nitrous acid) HL

Metal ion	Equilibrium	Log K 25°, 0.5	Log K 25°, 1.0	Log K 25°, 0	ΔH 25°, 0	ΔS 25°, 0
H^+	HL/H.L	2.94	3.00	3.15	(-2)[r]	(7)
		3.24[d]				
Cu^{2+}	ML/M.L	1.34	1.19 +0.01	2.02		
		1.26[d]	1.36[e]			
	$ML_2/M.L^2$	1.68	1.43 ±0.01	3.03		
		1.45[d]	1.54[e]			
Ag^+	ML/M.L	1.70	1.56[j]	2.32	(-7)[r]	(-14)
		1.31[k]	1.14[l]			
	$ML_2/M.L^2$	2.07	2.15[j]	2.51	(-11)[r]	(-26)
		2.06[k]	2.00[l]			
	M.L/ML(s)	-3.72[i]	-3.57[j]	-4.13	(15)[r]	(30)
		-3.36[k]	-3.22[l]			
Tl^+	ML/M.L			0.83		
Pd^{2+}	$ML_4/M.L^4$	20.3	21.6 +0.3			
Cd^{2+}	ML/M.L		1.7	2.4		
		1.78[d]	1.80[e]		-2.1[e]	1[e]
	$ML_2/M.L^2$	2.9[d]	3.0[e]		-4.2[e]	-1[e]
	$ML_3/M.L^3$		3.1[t]			
		3.5[d]	3.8[e]		-5.8[e]	-2[e]
Pb^{2+}	ML/M.L	1.89	1.90	2.51		
		1.91[d]				
	$ML_2/M.L^2$	2.7[u]	2.4[t]	3.0[v]		
	$ML_3/M.L^3$	3.0[u]		3.2[v]		

[d] 25°, 2.0; [e] 25°, 3.0; [i] 20°, 0.5; [j] 20°, 1.0; [k] 20°, 2.0; [l] 20°, 3.0; [r] 15-35°, 0; [t] 30°, 1.0; [u] 25°, 2.5; [v] 20°, 3.8

Bibliography:

H^+ 65LL,65LT,68TL
Cu^{2+} 46KS,51F,71T
Ag^+ 72TL
Tl^+ 57NBC
Pd^{2+} 65FK,70SS
Cd^{2+} 43L,58VE,61TB,65JG,65SGa,66Gb
Pb^{2+} 61TB,64GA,67JG,71TL

Other references: 00S,02B,06Ba,29KH,37SM, 57H,58TW,59VK,60SW,60Ta,63BW,64PS,66SNb, 67G,67SK,71Ta,71Tb,73CZ,73T

NO_3^-

O_3N^- Nitrate ion L^-

Metal ion	Equilibrium	Log K 25°, 0.5	Log K 25°, 1.0	Log K 25°, 0	ΔH 25°, 0	ΔS 25°, 0
Na^+	ML/M.L			(-0.6)[n]		
K^+	ML/M.L	-0.37[a]		(-0.15)±0.05	(-3)[r]	(-12)
Cs^+	ML/M.L			(0.01)[n]		
Be^{2+}	ML/M.L			-0.6[f]		
Ca^{2+}	ML/M.L	0.06	-0.06	0.7 -0.5	(-6)[s]	(-17)
		-0.02[d]	0.04[e]	0.08[f]		
	$ML_2/M.L^2$	-0.3	-0.5	0.6		
		-0.4[d]	-0.4[e]	-0.4[f]		
Sr^{2+}	ML/M.L	(0.06)	0.05	0.8 ±0.0	-2.4[b]	-8[b]
		0.06[d]	0.08[e]	0.10[f]		
	$ML_2/M.L^2$	(-0.5)	-0.3	0.8		
		-0.2[d]	(-0.4)[e]	-0.2[f]		
Ba^{2+}	ML/M.L	0.21	0.16	0.9 ±0.1	-3.2[b]	-10[b]
		0.14[d]	0.20[e]	0.24[f]		
	$ML_2/M.L^2$	0.1	0.0	1.0		
		0.0[d]	(-0.1)[e]	0.0[f]		
Sc^{3+}	ML/M.L			0.28[f]		
	$ML_2/M.L^2$			-0.3[f]		
La^{3+}	ML/M.L		0.1 +0.1			
Ce^{3+}	ML/M.L		0.2 -0.1			
Pr^{3+}	ML/M.L		0.2			
Nd^{3+}	ML/M.L		0.3			
Pm^{3+}	ML/M.L		0.39 -0.1			
Sm^{3+}	ML/M.L		0.3			
Eu^{3+}	ML/M.L	0.44	0.31 ±0.0	1.23	(-1)[t]	(-1)[c]
		0.26[d]		0.2[f]		
	$ML_2/M.L^2$			-0.6[f]		
Gd^{3+}	ML/M.L		0.0			

[a] 25°, 0.1; [b] 25°, 0.5; [c] 25°, 1.0; [d] 25°, 2.0; [e] 25°, 3.0; [f] 25°, 4.0; [n] 18°, 0; [r] 25-39°, 0; [s] 18-25°, 0; [t] 0-55°, 1.0

Nitrate ion (continued)

Metal ion	Equilibrium	Log K 25°, 0.5	Log K 25°, 1.0	Log K 25°, 0	ΔH 25°, 0	ΔS 25°, 0
Tb^{3+}	ML/M.L	0.10	0.05 -0.1	0.88		
Dy^{3+}	ML/M.L		-0.3			
Ho^{3+}	ML/M.L		-0.2			
Er^{3+}	ML/M.L		-0.3			
Tm^{3+}	ML/M.L		-0.25 -0.1			
Yb^{3+}	ML/M.L		-0.2			
Lu^{3+}	ML/M.L		-0.2			
Ac^{3+}	ML/M.L		0.1			
	$ML_2/M.L^2$		0.0			
Am^{3+}	ML/M.L	0.20[d]	0.26 ±0.00			
Ce^{4+}	ML/M.L			0.32[u]		
Th^{4+}	ML/M.L	0.67		0.45[g]		
	$ML_2/M.L^2$			0.15[g]		
U^{4+}	ML/M.L	0.20[d]	0.28[e]	1.6		
	$ML_2/M.L^2$	0.2[d]	0.3[e]			
	$ML_3/M.L^3$	0.0[d]	0.2[e]			
	$ML_4/M.L^4$	-0.5[d]	-0.2[e]			
Np^{4+}	ML/M.L	0.34[d]	0.38	1.7[o]		
	$ML_2/M.L^2$	0.2[d]	0.1[j]			
	$ML_3/M.L^3$		-0.3[j]			
Pu^{4+}	ML/M.L	0.46[d]	0.54	1.8		
				0.74[m]		
	$ML_2/M.L^2$			1.37[m]		
	$ML_3/M.L^3$			1.2[m]		
NpO_2^{+}	ML/M.L	-0.25[d]				
UO_2^{2+}	ML/M.L	-0.6[d]	-0.3[j]		(-3)[v]	(-13)[d]
NpO_2^{2+}	ML/M.L	-0.9				
		-0.4[d]				

[d] 25°, 2.0; [e] 25°, 3.0; [g] 25°, 6.0; [j] 20°, 1.0; [m] 20°, 4.0; [o] 20°, 0; [u] 23°, 3.5; [v] 10-40°, 2.0

Nitrate ion (continued)

Metal ion	Equilibrium	Log K 25°, 0.5	Log K 25°, 1.0	Log K 25°, 0	ΔH 25°, 0	ΔS 25°, 0
Mn^{2+}	ML/M.L	-0.38	-0.43	0.2		
		-0.41[d]	-0.24[e]	-0.14[f]		
	$ML_2/M.L^2$	-0.3	-0.6	0.6		
		-0.9[d]	-0.8[e]	-0.7[f]		
Co^{2+}	ML/M.L	(-0.46)	-0.46	0.2		
		-0.48[d]	-0.60[e]	-0.38[f]		
	$ML_2/M.L^2$	-0.3	-0.4			
		-0.6[d]	-0.6[e]	-0.4[f]		
Ni^{2+}	ML/M.L		-0.22	0.4		
		-0.44[d]	-0.55[e]	-0.30[f]		
	$ML_2/M.L^2$	-0.5[d]	-0.9[e]	-0.6[f]		
Cu^{2+}	ML/M.L	(-0.13)	-0.01	0.5		
		-0.06[d]	-0.02[e]	0.11[f]		
	$ML_2/M.L^2$		-0.6	-0.4		
		-0.6[d]	-0.5[e]	-0.4[f]		
	$M.(OH)^{1.5}.L^{0.5}/M(OH)_{1.5}L_{0.5}(s)$			-16.37		
Fe^{3+}	ML/M.L	-0.22[q]	-0.5	1.00	(-9)[y]	(-30)[c]
Zr^{4+}	ML/M.L	0.3[d]		0.34[m]		
	$ML_2/M.L^2$			0.1[m]		
	$ML_3/M.L^3$			-0.3[m]		
	$ML_4/M.L^4$			-0.8[m]		
Hf^{4+}	ML/M.L	0.34[d]		0.40[m]		
	$ML_2/M.L^2$	0.0[d]		0.1[m]		
	$ML_3/M.L^3$	-0.7[d]				
VO_2^+	ML/M.L		-0.5[j]			
Ag^+	ML/M.L	-0.34[d]		(-0.2) ±0.1		
Hg_2^{2+}	ML/M.L	0.08	0.02[e]			
	$ML_2/M.L^2$		-0.3[e]			
Tl^+	ML/M.L		-0.48[e]	0.33 ±0.00	-0.7	-1

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[c] 25°, 1.0; [d] 25°, 2.0; [e] 25°, 3.0; [f] 25°, 4.0; [j] 20°, 1.0; [m] 20°, 4.0; [q] 20°, 0.6; [y] 10-40°, 1.0

Nitrate ion (continued)

Metal ion	Equilibrium	Log K 25°, 0.5	Log K 25°, 1.0	Log K 25°, 0	ΔH 25°, 0	ΔS 25°, 0
Zn^{2+}	ML/M.L	-0.18	-0.19	0.4		
		-0.14[d]	0.01[e]	0.11[f]		
	$ML_2/M.L^2$		-0.6	-0.3		
		-0.8[d]	-1.1[e]	-0.8[f]		
Cd^{2+}	ML/M.L	-0.11	-0.05	0.5 -0.1	-5.2	-15
		0.02[d]	0.04[e] ±0.07	0.08[f]		
	$ML_2/M.L^2$		-0.8	0.2		
		-0.4[d]	(-0.6)[e]	0.0[f]		
Hg^{2+}	ML/M.L		0.11[e]			
	$ML_2/M.L^2$		0.0[e]			
Pb^{2+}	ML/M.L	0.25	0.33 ±0.02	1.17 ±0.02	-0.6	3
		0.40[d] ±0.1	0.51[e] ±0.06		-1.3[e]	-2[e]
	$ML_2/M.L^2$	0.4	0.4 ±0.1	1.4		
		0.4[d] ±0.2	0.4[e] ±0.1		-1.6[e]	-4[e]
	$ML_3/M.L^3$	0.1[d] ±0.1	0.2[e] ±0.1		(-2)[w]	(-6)[e]
	$ML_4/M.L^4$		-0.3[e] ±0.2		(-8)[w]	(-28)[e]
In^{3+}	ML/M.L	0.18[q]				
	$ML_2/M.L^2$	-0.3[q]				
Tl^{3+}	ML/M.L		0.90[e]		0.0[e]	4[e]
	$ML_2/M.L^2$		0.1[e]			
	$ML_3/M.L^3$		1.1[e]			
Bi^{3+}	ML/M.L	0.72	0.81	1.7		
		(0.72)[d]	(0.72)[e]	0.92[f]	(3)[x]	(13)[d]
	$ML_2/M.L^2$	(0.94)	0.90	2.5		
		0.98[d]	0.96[e]	1.23[f]		
	$ML_3/M.L^3$		0.7			
		(0.2)[d]	(0.1)[e]	1.1[f]		
	$ML_4/M.L^4$	(0.6)[d]	(-0.2)[e]	0.4[f]		
	$M.L/MOL(s).H^2$			-2.55		

[d] 25°, 2.0; [e] 25°, 3.0; [f] 25°, 4.0; [q] 20°, 0.7; [w] 2-64°, 3.0; [x] 5-55°, 2.0

Nitrate ion (continued)

Bibliography:

Na^{+} 27D

K^{+} 27D,27O,37RD,66CL

Cs^{+} 31BR

Be^{2+} 71SK

Ca^{2+}-Ba^{2+} 30RD,63VV,64V,66MB,74FRa

Sc^{3+} 66SH

La^{3+}-Lu^{3+},Am^{3+} 62PM,65CS,67K,67SS,69MK

Ac^{3+} 68SMR

Ce^{4+} 65PF

Th^{4+} 50DS,51ZA,56FM

U^{4+} 62EK,66SN

Np^{4+} 58SPS,66RY,66SN

Pu^{4+} 49Ha,51RL,60GN,66SN

NpO_2^{+} 64GS

UO_2^{2+} 51Aa,54DP,59VN

NpO_2^{2+} 66RY,70AW

Mn^{2+} 74FR

Co^{2+},Ni^{2+} 73FS

Cu^{2+} 49NT,73FR

Fe^{3+} 51ID,52S,59M,69MS

Zr^{4+} 49CMa,57S

Hf^{4+} 63PA,69HS

VO_2^{+} 66Ia

Ag^{+} 27D,31BR,37RD,46OA

Tl^{+} 37RD,57NN,65KMa

Zn^{2+} 73FR

Cd^{2+} 30RD,41L,61V,62V,74FRP

Hg_2^{2+},Hg^{2+} 46IS

Pb^{2+} 30RD,53HS,55BPR,55Na,56BD,63MK,63MKc, 65Ha,67FR,69FRa,72FR

In^{3+} 68FD

Tl^{3+} 65KY,67MK

Bi^{3+} 51SG,71FKM

Other references: 01E,28HE,36RR,37R,38R, 43RB,45Na,49BM,49ZN,51CM,51Mc,53Y, 54Pd,55Kb,55Ra,56HS,56M,57BW,57MP, 58FK,58MF,58PS,59CH,59ST,59T,59TC, 59TS,60D,60HR,60LP,60PB,60PN,61Kc, 61Ma,61NR,61TJ,62Hb,62MR,62NP,62PB, 62SK,62ST,63Hc,63KB,63LK,63M,63NPa, 63PF,63RSa,63SI,64BP,64DB,64FW,64HMF, 64HP,64LP,64MW,64NKa,64S,64SD,64DK, 65HD,64HS,65MS,66BA,66CK,66DO,66Gc, 66R,67AS,67EME,67KR,67VD,67VG,68DF, 68DP,68TR,69FR,69KM,69MF,69RP,69SGM, 70AS,70AW,70HK,70KS,70LK,70MM,70PH, 71GF,71M,71PJ,73Ab,73CDa,73HH,74FG, 74M,74MS

$H_2N_2O_2$

$H_2O_2N_2$ Hydrogen hyponitrite (hyponitrous acid) H_2L

Metal ion	Equilibrium	Log K 25°, 1.0	Log K 25°, 0	ΔH 25°, 0	ΔS 25°, 0
H^+	HL/M.L	10.85	11.54	(-8)[r]	(26)
	H_2L/HL.H	6.75	7.18 ±0.03	(-5)[s]	(16)
Ag^+	$M^2.L/M_2L(s)$		-18.89		

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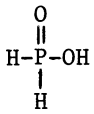
[r] 25-45°, 0; [s] 15-45°, 0

Bibliography:

H^+ 63BPa,63HS,63Pa

Ag^+ 61PY

Other references: 39LZ,59Pc



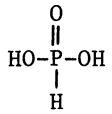
H_3O_2P Hydrogen hypophosphite (hypophosphorous acid) HL

Metal ion	Equilibrium	Log K 20°, 0.2	Log K 25°, 1.0	Log K 25°, 0	ΔH 25°, 0	ΔS 25°, 0
H^+	HL/H.L			1.23 ±0.2	1.6	11
Eu^{3+}	ML/M.L			2.27		
Cr^{3+}	ML.H/M.HL		1.32[r]			
Fe^{3+}	ML/M.L	4.01				
	$ML_2/M.L^2$	6.79				
	$ML_3/M.L^3$	8.96				
Zn^{2+}	ML/M.L		0.54[f]			
	$ML_2/M.L^2$		0.2[f]			

[f] 25°, 4.0; [r] 45°, 1.0

Bibliography:

H^+ 50Fa,54PM,59D
Eu^{3+} 64B
Cr^{3+} 66EB
Fe^{3+} 67MAN
Zn^{2+} 68HG
Other references: 20M,30Ma,34GM,37N,64NM, 66CT,67MG,68LN



H_3O_3P Hydrogen phosphite (phosphorous acid) H_2L

Metal ion	Equilibrium	Log K 25°, 0.5	Log K 25°, 1.0	Log K 25°, 0	ΔH 25°, 0	ΔS 25°, 0
H^+	HL/H.L	6.08	6.01	6.79 +0.01	2.2	39
		6.34[a]	6.00[d]	6.06[e]		
	H_2L/HL.H	1.1[r]		1.5 ±0.1	2.2	14
Na^+	ML/M.L			1.05[o]		
	MHL/M.HL			0.96[o]		
K^+	ML/M.L			0.80[o]		
	MHL/M.HL			0.74[o]		
Ni^{2+}	MHL/M.HL	3.60[s]				
	MH_2L/M.H_2L	1.45[s]				
Cu^{2+}	ML_2/M.L^2		4.57[t]			
	M.L/ML(s)		-6.72[t]			
Fe^{3+}	MHL/M.HL			4.92		
	$M(HL)_2$/M.$(HL)^2$			7.84		
CH_3Hg^+	ML/M.L	4.67[h]				

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[a] 25°, 0.1; [d] 25°, 2.0; [e] 25°, 3.0; [h] 20°, 0.1; [o] 20°, 0; [r] 25°, 0.6; [s] 25°, 0.2; [t] 25°, 3.5

Bibliography:

H^+ 30N,40GM,41TY,59D,68MS

Na^+,K^+ 64FP

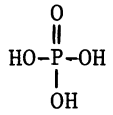
Ni^{2+} 70EE

Cu^{2+} 64N

Fe^{3+} 66MA

CH_3Hg^+ 65SS

Other references: 20B,27K,30Ma,37N,50Fa, 65FP,66P,67PS,68HG



H_3O_4P Hydrogen phosphate (phosphoric acid) H_3L

Metal ion	Equilibrium	Log K 25°, 0.5	Log K 25°, 1.0	Log K 25°, 0	ΔH 25°, 0	ΔS 25°, 0
H^+	HL/H.L	11.74[a]±0.08	10.79[e]±0.07	12.35 ±0.02	-3.5 ±0.9	45
	H_2L/HL.H	6.57 ±0.05	6.46 ±0.02	7.199±0.002	-0.8 ±0.2	30
		5.72[a]±0.05	6.36[d]		-1.2[a]	
		6.79[r,s]	6.26[e]±0.02			
	H_3L/H_2L.H	1.72	1.70 ±0.02	2.148+0.001	1.9 ±0.1	16
		2.0[a] ±0.1	1.86[e]±0.03			
Li^+	MHL/M.HL	0.72[r,s]			(6)[r,t]	(23)[r,s]
Na^+	MHL/M.HL	0.60[r,s]			(8)[r,t]	(30)[r,s]
K^+	MHL/M.HL	0.49[r,s]			(6)[r,t]	(22)[r,s]
Mg^{2+}	ML/M.L		3.4[u]			
	MHL/M.HL	1.7[a]	1.8[u] ±0.0	2.91	3	23
		1.88[r,s]	1.42[e]			
	$MH_2L/M.H_2L$		0.7[u]			
			0.16[e]			
	$M^3.L^2/M_3L_2(H_2O)_8$(s)			-25.20		
	M.HL/MHL$(H_2O)_3$(s)			-5.82		
Ca^{2+}	ML/M.L			6.46	(3)[v]	(40)
	MHL/M.HL	1.50[s]	1.3[u]	2.74 -0.06	(3)[v]	(23)
		1.70[r,s]				
	$MH_2L/M.H_2L$		0.6[u]	1.4 -0.6	(3)[v]	(17)
	M.HL/MHL$(H_2O)_2$(s)			-6.58 ±0.03	(1)[w]	(-28)
Sr^{2+}	ML/M.L	(4.2)[h]				
	MHL/M.HL	1.2[h]				
		1.52[r,s]				
	$MH_2L/M.H_2L$	0.3[h]				
	M.HL/MHL(s)			-6.92[o]		
Ba^{2+}	M.HL/MHL(s)			-7.40[o]		
Y^{3+}	$MH_2L/M.H_2L$	1.84[x]		2.65		

[a] 25°, 0.1; [d] 25°, 2.0; [e] 25°, 3.0; [h] 20°, 0.1; [o] 20°, 0; [r] $(C_3H_7)_4NCl$ used as background electrolyte; [s] 25°, 0.2; [t] 0-25°, 0.2; [u] 37°, 0.15; [v] 25-37°, 0; [w] 18-37°, 0; [x] 20°, 0.2

Hydrogen phosphate (continued)

Metal ion	Equilibrium	Log K 25°, 0.5	Log K 25°, 1.0	Log K 25°, 0	ΔH 25°, 0	ΔS 25°, 0
La^{3+}	$MH_2L/M.H_2L$	1.61				
	M.L/ML(s)	-22.43				
Ce^{3+}	ML/M.L			(18.52)		
	$MH_2L/M.H_2L$	1.52[x]		2.33		
Pm^{3+}	$MH_2L/M.H_2L$	1.69[x]		2.51		
Gd^{3+}	M.L/ML(s)	-22.26				
Ac^{3+}	$MH_2L/M.H_2L$	1.59				
Am^{3+}	$MH_2L/M.H_2L$	1.69[x]		2.51		
Th^{4+}	$MH_2L/M.H_2L$	3.96[d]				
	$M(H_2L)_2/M.(H_2L)^2$	7.5[d]				
UO_2^{2+}	$M^3.L^2/M_3L_2(s)$	-49.7[i]				
	M.HL/MHL(s)	-12.17[i]				
Fe^{2+}	MHL/M.HL			3.6		
	$MH_2L/M.H_2L$			2.7		
	$M^3.L^2/M_3L_2(H_2O)_8(s)$			-36.0		
Co^{2+}	MHL/M.HL	2.18[a]				
Ni^{2+}	MHL/M.HL	2.08[a]	2.00[y]			
Cu^{2+}	MHL/M.HL	3.2[a]	3.3[u]			
	$MH_2L/M.H_2L$		1.3[u]			
Fe^{3+}	MHL/M.HL	8.30				
	$MH_2L/M.H_2L$	3.47				
	$M.L/ML(H_2O)_2(s)$			-26.4		
VO^{2+}	$M^3.L^2/M_3L_2(s)$	-24.01[a]		-25.1		
Ag^+	$M^3.L/M_3L(s)$			-17.55		
Hg_2^{2+}	M.HL/MHL(s)			-12.40		
CH_3Hg^+	MHL/M.HL	5.03[h]				
Zn^{2+}	MHL/M.HL	2.4[a]	2.4[u]			
	$MH_2L/M.H_2L$		1.2[u]			
	$M^3.L^2/M_3L_2(H_2O)_4(s)$			-35.3		

[a] 25°, 0.1; [d] 25°, 2.0; [h] 20°, 0.1; [i] 20°, 0.3; [u] 37°, 0.15; [x] 20°, 0.2; [y] 15°, 0.1

Hydrogen phosphate (continued)

Metal ion	Equilibrium	Log K 25°, 0.5	Log K 25°, 1.0	Log K 25°, 0	ΔH 25°, 0	ΔS 25°, 0
Pb^{2+}	MHL/M.HL			3.1		
	$MH_2L/M.H_2L$			1.5		
	$M^3.L^2/M_3L_2(s)$			-43.53[z]		
	M.HL/MHL(s)			-11.43		
Ga^{3+}	M.L/ML(s)		-21.0			
In^{3+}	$MH_2L/M.H_2L$		1.43[j]			
	M.L/ML(s)		-21.63			

[j] 20°, 0.9; [z] 38°, 0

Bibliography:

H^+ 29BU,32JP,37P,43BA,51B,55CD,56Bb,56MS, 56SA,57DS,57ET,57Ta,58Ga,59D,61DK,61VQ, 62CI,63GS,63Sb,63SG,64SSL,65HC,66CI, 66IT,67SB,69C,69MKb,69PN,70BS,71Pa, 72MR,74HH,74MB

Li^+-K^+ 56SA

Mg^{2+} 54CC,54HP,56SAa,63TF,70C,74HH

Ca^{2+} 40GR,49Bb,53DH,56SAa,57SN,60M,66MG,68CM, 70C

Sr^{2+} 56SAa,62GG,66SM

Ba^{2+} 66SM

Y^{3+},Pm^{3+},Am^{3+} 66BE

La^{3+} 63TV,70RS

Ce^{3+} 50MS,66BE

Gd^{3+} 67TP

Ac^{3+} 70RS

UO_2^{2+} 65VP

Th^{4+} 51ZA

Fe^{2+} 72N

Co^{2+} 67SB

Ni^{2+} 67SB,72FS

Cu^{2+} 67SB,70C

Fe^{3+} 63GS,72Na

VO^{2+} 56ZK

Ag^+ 70Bd

Hg_2^{2+} 49DC

CH_3Hg^+ 65SS

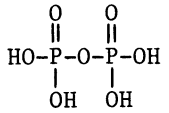
Zn^{2+} 67SB,70C,73N

Pb^{2+} 32JP,72Nb

Ga^{3+} 64TC

In^{3+} 68DT

Other references: 03B,03RD,09AB,14MG,17B, 20B,20K,24PWa,25DS,25HL,25MM,26SN,27B, 27C,27K,27SH,29B,29JM,29Ka,29MJ,30HKa, 30Ma,31BD,31L,32BR,33N,34GS,34N,36SE, 40GR,42Ha,42LK,42TL,42W,44A,56G,45M, 46H,49Ka,50CJ,50Fa,51HM,51Z,51ZA,52TM, 53BS,53BSL,53GC,54BR,54HP,54TO,55C, 55KE,55KJ,56CS,57CJ,57D,57DS,57TV, 58ES,58KB,58KC,58Mb,58Mc,59LP,59SV, 60DM,60FSA,60GL,60MM,61BM,61BN,61CA, 61CAa,61EA,61ICa,61K,61KZ,61TG,61WL, 62AM,62F,62FE,62L,62ML,62RD,63G,63MG, 63PG,63UK,64DRC,64LA,64MP,64WE,65HSE, 65PE,65PT,66DM,66GM,66LA,67DS,67KPb, 67ME,67MSP,67WW,68Ba,68Ca,68MD,69BPa, 69IVa,70GM,70GS,70IV,70LS,71MM,73FA, 73IV,73NM,73RM,73SZ,74Fa,74FGA,74IK, 74RM



$H_4O_7P_2$ Hydrogen diphosphate (pyrophosphoric acid) H_4L

Metal ion	Equilibrium	Log K 25°, 0.1	Log K 25°, 1.0	Log K 25°, 0	ΔH 25°, 0	ΔS 25°, 0
H^+	HL/H.L	8.37 ±0.08	7.43 +0.07	9.40 ±0.1	-0.39 ±0.0	42
		9.00[r]±0.05	8.74[r]±0.04	7.17[e]		
	H_2L/HL.H	6.04 ±0.04	5.41 ±0.05	6.70 ±0.1	-0.13 ±0.0	30
		6.19[r]+0.07	5.98[r]±0.00	5.29[e]		
	$H_3L/H_2L.H$	1.8	1.4 +0.1	2.2 ±0.1	1.0	13
		2.0[r] ±0.1	1.7[r] ±0.0	1.4[e]		
	$H_4L/H_3L.H$		0.8	0.8 ±0.1	1.5	9
		0.8[r]	0.7[r] ±0.1			
Li^+	ML/M.L			3.4 ±0.3	1.0	19
			2.39[r]		0.3[c,r]	12[c,r]
	MHL/M.HL			2.0	0.3	10
			1.03[r]		-0.2[c,r]	4[c,r]
Na^+	ML/M.L	0.21[d]		2.29 ±0.07	1.4	15
			1.00[r]		0.5[c,r]	6[c,r]
	M_2L/ML.M	-0.8[d]		1.9 ±0.6		
	MHL/M.HL	-0.5[d]		1.4 ±0.1		
K^+	ML/M.L			2.1	1.7	15
			0.80[r]		0.7[c,r]	6[c,r]
Mg^{2+}	ML/M.L	5.45	5.42[r]-0.01	7.2	3[t]	43
	$ML_2/M.L^2$		7.80[r]±0.05			
	MHL/M.HL	3.18[s]	3.06[r]-0.01			
	MOHL/M.OH			2.1		
Ca^{2+}	ML/M.L	5.4[r]	4.9[r] ±0.0	6.8		
	MHL/M.HL	3.3[r]	2.3[r] -0.1			
	MOHL/M.OH			2.1		
	$ML.M/M_2L(s)$			-7.9		

[c] 25°, 1.0; [d] 25°, 2.0; [e] 25°, 3.0 Na^+; [r] $(CH_3)_4N$ salt used as background electrolyte; [s] 15°, 0.1; [t] 25°, var.

Hydrogen diphosphate (continued)

Metal ion	Equilibrium	Log K 25°, 0.1	Log K 25°, 1.0	Log K 25°, 0	ΔH 25°, 0	ΔS 25°, 0
Sr^{2+}	ML/M.L	3.26[h]		5.4		
	MOHL/ML.OH			2.3		
	ML.M/M_2L(s)			-7.5		
La^{3+}	ML/M.L			16.72		
	ML_2/M.L^2			18.57		
	M_2L/M^2.L			19.59 ±0.06		
Ce^{3+}	ML/M.L			17.15		
Nd^{3+}	M_2L/M^2.L			19.98		
Sm^{3+}	M_2L/M^2.L			20.16		
Eu^{3+}	M_2L/M^2.L			20.27		
Gd^{3+}	M_2L/M^2.L			20.45		
Tb^{3+}	M_2L/M^2.L			20.50		
Dy^{3+}	M_2L/M^2.L			20.64		
Ho^{3+}	M_2L/M^2.L			20.9		
Er^{3+}	M_2L/M^2.L			21.29		
Yb^{3+}	ML/M.L			17.5		
	ML_2/M.L^2			19.4		
	M_2L/M^2.L			21.88		
	$M^4.L^3/M_4L_3$(s)			(-75.0)		
Lu^{3+}	M_2L/M^2.L			22.23		
Ce^{4+}	ML/M.L	(18.41)				
	M.L/ML(s)	-23.36				
Co^{2+}	ML/M.L	6.1				
		7.36[r]				
	MHL/M.HL	3.4				
		4.07[r]				
Ni^{+}	ML/M.L	5.94			4.2[t]	41[a]
		7.01[r]				
	ML_2/M.L^2				2.0[t]	
	MHL/M.HL	(3.71)				
		3.81[r]				

[h] 20°, 0.1; [r] $(CH_3)_4N$ salt used as background electrolyte; [t] 25°, var

Hydrogen diphosphate (continued)

Metal ion	Equilibrium	Log K 25°, 0.1	Log K 25°, 1.0	Log K 25°, 0	ΔH 25°, 0	ΔS 25°, 0
Cu^{2+}	ML/M.L		7.6			
			9.07[r]			
	$ML_2/M.L^2$		12.45		(-0.7)[t]	(55)[c]
			16.65[r]			
	MHL/M.HL		4.45			
			5.37[r]			
	$MH_2L/M.H_2L$		1.99			
			2.55[r]			
	$MHL_2/ML_2.H$		4.9			
			6.61[r]			
	$MH_2L_2/MHL_2.H$		4.7			
			5.63[r]			
	$MH_3L_2/MH_2L_2.H$		3.7			
			4.25[r]			
	$MH_4L_2/MH_3L_2.H$		2.7			
			3.06[r]			
	$MH_5L_2/MH_4L_2.H$		1.7			
Mn^{3+}	ML/M.L	16.68[u]				
	$ML_2/M.L^2$	31.85[u]				
	$MH_2L/M.H_2L$	5.11[u]				
	$M(H_2L)_2/M.(H_2L)^2$	8.41[u]				
	$M(H_2L)_3/M.(H_2L)^3$	11.24[u]				
Hg_2^{2+}	$ML_2/M.L^2$		12.38[v]			
	MOHL/M.OH.L		15.64[v]			
Tl^{+}	ML/M.L	1.69[w]				
	$ML_2/M.L^2$	1.9[w]				
Zn^{2+}	ML/M.L			8.7		
	$ML_2/M.L^2$			11.0	2.6[t]	59
	MOHL/ML.OH			4.4		
Cd^{2+}	ML/M.L			(8.7)		
	MOHL/ML.OH			3.1		
Hg^{2+}	MOHL/M.OH.L		17.45[v]			

[c] 25°, 1.0; [r] $(CH_3)_4N$ salt used as background electrolyte; [t] 25°, var.; [u] 25°, 0.3; [v] 27°, 0.75; [w] 35°, 2.0

Hydrogen diphosphate (continued)

Metal ion	Equilibrium	Log K 25°, 0.1	Log K 25°, 1.0	Log K 25°, 0	ΔH 25°, 0	ΔS 25°, 0
Pb^{2+}	ML/M.L		7.3			
	$ML_2/M.L^2$		10.15		(-1.0)[t]	(43)[c]

[c] 25°, 1.0; [t] 25°, var.

Bibliography:

H^+ 28KB,49M,50SZ,54BR,55D,57LW,59WO,60N, 61I,61ICa,63JW,64HM,64WS,66IT,66MM,68BC, 68MHB,70VA,70VAa,72FS,73PS,73VAK

Li^+-K^+ 49M,55D,57LW,59WO,73VA

Mg^{2+} 57LWa,57V,59WO,61I,61IC,72FS

Ca^{2+} 59WL,59WO,60IC

Sr^{2+} 59WO,62GG

La^{3+},Nd^{3+}-Lu^{3+} 66SS,67SSc

Ce^{3+} 50MS

Ce^{4+} 67MSK

Co^{2+} 63JW,64HM

Ni^{2+} 56YVa,64HM,73PS

Cu^{2+} 56YVa,63SS,68BC

Mn^{3+} 70GSM

Hg_2^{2+} 59YD,60YD

Tl^+ 52SD

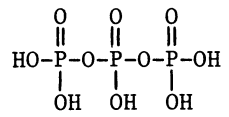
Zn^{2+} 56YVa,59WO

Cd^{2+} 59WO

Hg^{2+} 60YD

Pb^{2+} 56YVa,68CFa

Other references: 09AB,28M,30Ma,32Ma,47SF, 49E,49RR,50Ha,50LO,50VC,53GC,53LU, 53WA,54GC,54UL,56UL,56YV,56YVb,58O, 58PT,58VR,60FSA,60FT,60Oa,62AM,62NM, 64GL,64SSa,64WE,65BCY,65HS,65PE,65SMc, 66ASS,66GL,66MI,66VV,67MNU,67SA,68MSb, 68PV,69SA,71BSb,71MM,72BPb,72LG,73RM



$H_5O_{10}P_3$ Hydrogen triphosphate (triphosphoric acid) H_5L

Metal ion	Equilibrium	Log K 25°, 0.1	Log K 25°, 1.0	Log K 25°, 0	ΔH 25°, 0	ΔS 25°, 0
H^+	HL/H.L	8.00 ±0.1		9.25 ±0.01	-0.1	42
		8.70[r] ±0.1	8.61[r]±0.05		-0.1[h,r]	40[a,r]
	H_2L/HL.H	5.50 ±0.1		9.54 ±0.07	1.4 ±0.1	35
		5.90[r] ±0.1	5.69[r]-0.01			
	$H_3L/H_2L.H$	(2.6)		2.5 ±0.3		
		2.2[r] -0.1	2.0[r] ±0.0			
	$H_4L/H_3L.H$		1.0[r] ±0.1			
Li^+	ML/M.L		2.87[r]	3.9		
	MHL/M.HL		1.88[r]			
Na^+	ML/M.L		1.64[r]	2.7 ±0.1		
	MHL/M.HL		0.77[r]			
K^+	ML/M.L		1.39[r]			
Be^{2+}	ML/M.L				4,7[h,r]	
	MHL/ML.H	5.35[h,r]				
Mg^{2+}	ML/M.L	5.76 ±0.1		8.6		
		7.11[r]	5.82[r]±0.02		4.3[h,r]	47[a,r]
	MHL/M.HL	3.5 ±0.2				
		4.45[h,r]	3.35[r]±0.01			
	MOHL/ML.OH			2.4		
Ca^{2+}	ML/M.L	5.20 ±0.2		8.1		
		6.38[r] ±0.03	5.40[r]±0.04		3.3[h,r]	40[a,r]
	MHL/M.HL	3.04 +0.1				
		4.02[h,r]-0.2	2.9[r] ±0.1			
	MOHL/ML.OH			2.3		
Sr^{2+}	ML/M.L	4.10 ±0.2		7.2		
		5.50[r]			3.3[h,r]	36[a,r]
	MHL/M.HL	2.53 ±0.3				
		3.56[h,r]				
	MOHL/ML.OH			2.1		

[a] 25°, 0.1; [h] 20°, 0.1; [r] $(CH_3)_4N$ salt used as background electrolyte.

Hydrogen triphosphate (continued)

Metal ion	Equilibrium	Log K 25°, 0.1	Log K 25°, 1.0	Log K 25°, 0	ΔH 25°, 0	ΔS 25°, 0
Ba^{2+}	ML/M.L	3.3		6.3		
	MHL/M.HL	1.8				
	ML.M/M_2L(s)			-9.8		
Mn^{2+}	ML/M.L	7.15				
		8.08[r]			2.8[h,r]	46[a,r]
	MHL/M.HL	3.77				
		5.08[h,r]				
Co^{2+}	ML/M.L	6.94				
		8.01[r]+0.1			4.5[h,r]	52[a,r]
	MHL/M.HL	3.81				
		4.93[h,r]				
Ni^{2+}	ML/M.L	6.75				
		7.86[r]+0.04			5.0[h,r]	53[a,r]
	MHL/M.HL	3.65				
		4.9[h,r]				
Cu^{2+}	ML/M.L	8.3				
		9.36[r]			4.9[h,r]	59[a,r]
	MHL/M.HL	4.34				
		6.1[h,r]				
Hg_2^{2+}	$ML_2/M.L^2$		11.23[t]			
	MOHL/M.OH.L		15.00[t]			
Tl^{+}	ML/M.L		1.34[u]			
	$ML_2/M.L^2$		2.26[u]			
Zn^{2+}	M./M.L	7.5		(9.7)		
		8.43[r]			6.3[h,r]	60[a,r]
	MHL/M.HL	3.92				
		5.13[h,r]				
	MOHL/ML.OH			3.3		
Cd^{2+}	ML/M.L	6.58		9.8		
		8.13[r]			2.7[h,r]	46[a,r]
	MHL/M.HL	3.60				
		4.97[h,r]				
	MOHL/ML.OH			2.8		

[a] 25°, 0.1; [h] 20°, 0.1; [r] $(CH_3)_4N$ salt used as background electrolyte; [t] 27°, 0.75; [u] 20°, 2.4

Hydrogen triphosphate (continued)

Bibliography:

H^+ 54BR,56MS,56WL,57Lb,61I,61ICa,62CI, 63JW,64EM,64HM,65Aa,65PE,66IT,68MHB, 71TR,72FS,73TR

Li^+-K^+ 49Ma,57WL,59WO

Be^{2+} 65Aa

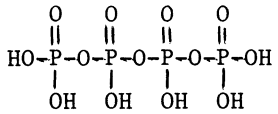
Mg^{2+}-Ba^{2+} 56MS,57LWa,59WL,59WO,60IC,61I, 61ICa,62GG,63JW,64EM,65Aa,72FS

Mn^{2+}-Cu^{2+},Zn^{2+},Cd^{2+} 64EM,64HM,65Aa

Hg_2^{2+} 60YD

Tl^+ 74F

Other references: 49T,50VC,53GC,55Lb,56Kc, 57Ka,57Mb,57PL,60G,62RK,62RKa,62SLW, 63Ka,64SSa,64SSG,64WS,65KS,66MI,67ASa, 68ASc,68SA,68WSa,71SB,74TR



$H_6O_{13}P_4$ Hydrogen tetraphosphate (tetraphosphoric acid) H_6L

Metal ion	Equilibrium	Log K 25°, 1.0
H^+	HL/H.L	8.34[r]
	$H_2L/HL.H$	(6.63)[r]
	$H_3L/H_2L.H$	2.23[r]
	$H_4L/H_3L.H$	1.4[r]
Li^+	ML/M.L	(2.64)[r]
	MHL/M.HL	(1.59)[r]
Na^+	ML/M.L	1.79[r]
	MHL/M.HL	1.10[r]
K^+	ML/M.L	1.71[r]
	MHL/M.HL	(1.11)[r]
Mg^{2+}	ML/M.L	6.04[r]
	MHL/M.HL	3.74[r]
	$M_2L/ML.M$	2.19[r]
Ca^{2+}	ML/M.L	5.46[r]-0.01
	MHL/M.HL	3.54[r]-0.2
	$M_2L/ML.M$	3.07[r]+0.3
Sr^{2+}	ML/M.L	4.82[r]
	MHL/M.HL	3.49[r]
	$M_2L/ML.M$	3.42[r]
Cu^{2+}	ML/M.L	9.44[r]
	$ML_2/M.L^2$	10.60[r]
	MHL/M.HL	6.66[r]
	$MH_2L/M.H_2L$	3.48[r]
	MOHL/ML.OH	3.86[r]
	$MHL_2/ML_2.H$	8.40[r]
	$MH_2L_2/MHL_2.H$	7.28[r]
	$MH_3L_2/MH_2L_2.H$	4.52[r]
	$MH_4L_2/MH_3L_2.H$	3.55[r]

[r] $(CH_3)_4NCl$ used as background electrolyte.

Hydrogen tetraphosphate (continued)

Bibliography:

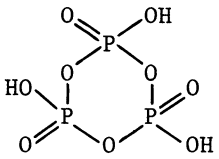
H^+ 63WS

Li^+-K^+ 67WM

Mg^{2+}-Sr^{2+} 68WM,69WKa

Cu^{2+} 68WM

Other references: 68WS,68MHB



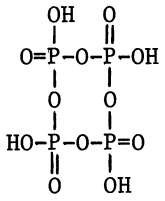
$H_3O_9P_3$ Hydrogen trimetaphosphate (trimetaphosphoric acid) H_3L

Metal ion	Equilibrium	Log K 20°, 0.1	Log K 25°, 1.0	Log K 25°, 0
H^+	HL/H.L	1.35	0.65[r]	2.05
Na^+	ML/M.L			1.40 -0.2
Mg^{2+}	ML/M.L	1.11		3.31
Ca^{2+}	ML/M.L	2.06	1.64[r]	3.47 ±0.02
Sr^{2+}	ML/M.L	1.99[s]±0.04		3.35
Ba^{2+}	ML/M.L			3.35
La^{3+}	ML/M.L			5.70
Pm^{3+}	ML/M.L	3.80[s]		5.74
Am^{3+}	ML/M.L	3.48[s]		6.06
Cm^{3+}	ML/M.L	3.64[s]		5.92
Mn^{2+}	ML/M.L			3.57
Ni^{2+}	ML/M.L			3.22
Cu^{2+}	ML/M.L		1.58[r]	
	$ML_2/H.L^2$		2.2[r]	
Zn^{2+}	ML/M.L	1.94[s]		

[r] $(CH_3)_4NNO_3$ used as background electrolyte; [s] 20°, 0.2

Bibliography:

H^+ 49DM,49Z,69WK
Na^+ 49DM,69GN
Mg^{2+} 49JM,49Z
Ca^{2+} 49DM,49JM,69WKa,74KO
Sr^{2+} 52M,62GG,74KO
Ba^{2+},Mn^{2+},Ni^{2+} 49JM
La^{3+} 52Ma
Pm^{3+}-Cm^{3+} 67EL
Cu^{2+} 69WK
Zn^{2+} 74KO
Other references: 53GC,58I,62RK,65IM,68WSa



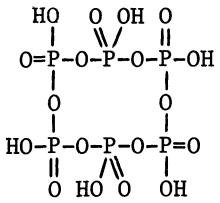
$H_4O_{12}P_4$ Hydrogen tetrametaphosphate (tetrametaphosphoric acid) H_4L

Metal ion	Equilibrium	Log K 20°, 0.1	Log K 25°, 1.0	Log K 25°, 0
H^+	HL/H.L		1.53[r]	2.76 ±0.02
Na^+	ML/M.L		0.81[r,u]	2.10 ±0.05
Mg^{2+}	ML/M.L			5.17
Ca^{2+}	ML/M.L	3.28 2.90[s]	3.1[r]	5.37 ±0.05
	$ML_2/M.L^2$			8.02 ±0.1
Sr^{2+}	ML/M.L	2.80[t]		5.12
	$ML_2/M.L^2$			7.54
Ba^{2+}	ML/M.L			4.99
La^{3+}	ML/M.L			6.66
Mn^{2+}	ML/M.L			5.74
Co^{2+}	ML/M.L	2.62[s]		
Ni^{2+}	ML/M.L		2.63[r,u]	4.95
	$ML_2/M.L^2$		3.48[r,u]	
Cu^{2+}	ML/M.L		3.04[r] 3.18[r,u]	
	$ML_2/M.L^2$		4.28[r] 4.64[r,u]	
Zn^{2+}	ML/M.L	2.86[s]		

[r] $(CH_3)_4NNO_3$ used as background electrolyte; [s] 20°, 0.2; [t] 20°, 0.15; [u] 30°, 1.0

Bibliography:

H^+ 49DM,54BR,69WK
Na^+ 49DM,55GG,69GN,72KO
Mg^{2+},Ba^{2+},Mn^{2+} 50JMa
Ca^{2+} 49DM,50JMa,69WKa,74KO
Sr^{2+} 52M,62GG
La^{3+} 52Ma
Co^{2+},Zn^{2+} 74KO
Ni^{2+} 50JMa,55GG
Cu^{2+} 55GG,69WK
Other references: 53GC,62RK,65IM

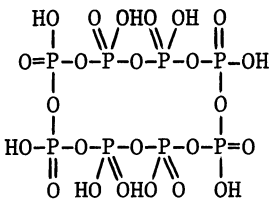


$H_6O_{18}P_6$ Hydrogen hexametaphosphate (hexametaphosphoric acid) H_6L

Metal ion	Equilibrium	Log K 20°, 0.1	Log K 25°, 0.2	Log K 25°, 0
Na^+	ML/M.L			4.3
Ca^{2+}	ML/M.L	4.59	4.11	6.9[o]
Sr^{2+}	ML/M.L		3.73	
Co^{2+}	ML/M.L		3.65	
Zn^{2+}	ML/M.L		3.95	

[o] 20°, 0

Bibliography: Na^+ 72KO Ca^{2+}-Zn^{2+} 74KO

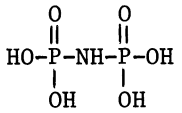


$H_8O_{24}P_8$ Hydrogen octametaphosphate (octametaphosphoric acid) H_8L

Metal ion	Equilibrium	Log K 20°, 0.1	Log K 25°, 0.2	Log K 25°, 0
Na^+	ML/M.L			4.6
Ca^{2+}	ML/M.L	5.18	4.62	8.1[o]
Sr^{2+}	ML/M.L		4.30	
Co^{2+}	ML/M.L		4.80	
Zn^{2+}	ML/M.L		5.02	

[o] 20°, 0

Bibliography: Na^+ 72KO Ca^{2+}-Zn^{2+} 74KO

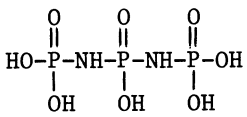


$H_5O_6NP_2$ Hydrogen imidodiphosphate (imidodiphosphoric acid) H_4L

Metal ion	Equilibrium	Log K 25°, 0.1	Log K 25°, 1.0	Log K 25°, 0	ΔH 25°, 0	ΔS 25°, 0
H^+	HL/H.L	10.22	10.36			
	H_2L/HL.H	7.3	7.6			
	$H_3L/H_2L.H$	2.66	3.1			
	$H_4L/H_3L.H$	1.5	1.5			
Ca^{2+}	ML/M.L	5.59	4.59	6.1	(-6)[r]	(0)
	MHL/M.HL	3.33	3.15	3.4		

[r] 25-50°, 0

Bibliography: H^+ 61ICa Ca^{2+} 61IC

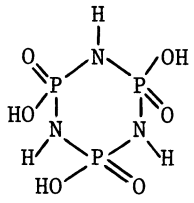


$H_7O_8N_2P_3$ Hydrogen diimidotriphosphate (diimidotriphosphoric acid) H_5L

Metal ion	Equilibrium	Log K 25°, 0.1	Log K 25°, 1.0	Log K 25°, 0	ΔH 25°, 0	ΔS 25°, 0
H^+	HL/H.L	9.84	10.00			
	H_2L/HL.H	6.61	6.86			
	$H_3L/H_2L.H$	3.03	3.36			
	$H_4L/H_3L.H$	2	2.0			
	$H_5L/H_4L.H$	1	1.0			
Ca^{2+}	ML/M.L	6.7	5.7	7.1	(-9)[r]	(-6)
	MHL/M.HL	4.44	4.16	4.6		

[r] 25-50°, 0

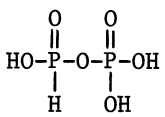
Bibliography: H^+ 61ICa Ca^{2+} 61IC



$H_6O_6N_3P_3$ Cyclo-tri-μ-imidotris(dioxophosphate) (trimetaphosphimic acid) H_3L

Metal ion	Equilibrium	Log K 20°, 0.1
H^+	$L/H_{-1}L.H$	12.19
	HL/H.L	3.23
Mg^{2+}	ML/M.L	1.28

Bibliography: 49Z

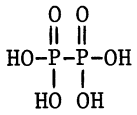


$H_4O_6P_2$ Hydrogen diphosphate (III,V) (isohypophosphoric acid) H_3L

Metal ion	Equilibrium	Log K 25°, 0.5	Log K 25°, 1.0	Log K 25°, 0
H^+	HL/H.L	6.10[r]	6.19[r]	6.26
		6.14[a,r]		
	$H_2L/HL.H$	1.35[r]	1.57[r]	1.67
		1.56[a,r]		
Li^+	ML/M.L	0.82[r]		
Na^+	ML/M.L	0.50[r]		
K^+	ML/M.L	0.36[r]		
Mg^{2+}	ML/M.L	2.65[r]		
Ca^{2+}	ML/M.L	2.27[r]		

[a] 25°, 0.1; [r] $(CH_3)_4NCl$ used as background electrolyte.

Bibliography: 67CM

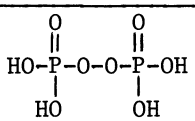


$H_4O_6P_2$ Hydrogen hypophosphate (hypophosphoric acid) H_4L

Metal ion	Equilibrium	Log K 25°, 0.1	Log K 25°, 0
H^+	HL/H.L	9.48	
	H_2L/HL.H	6.77	
	$H_3L/H_2L.H$	2.1	
Na^+	ML/M.L		2.31
	MHL/M.HL		1.32

Bibliography:

H^+ 50SZ Na^+ 67NS



$H_4O_8P_2$ Hydrogen peroxodiphosphate H_4L

Metal ion	Equilibrium	Log K 25°, 1.0	Log K 25°, 0
H^+	HL/H.L	7.19[r]	7.68
	H_2L/HL.H	4.64[r]	5.18
Li^+	ML/M.L	1.34[r]	
	MHL/M.HL	0.70[r]	
Na^+	ML/M.L	1.02[r]	
	MHL/M.HL	0.25[r]	
K^+	ML/M.L	1.01[r]	
Mg^{2+}	ML/M.L	3.33[r]	
	MHL/M.HL	1.76[r]	
	$M_2L/M^2.L$	1.32[r]	

[r] $(CH_3)_4NCl$ used as background electrolyte.

Bibliography: 60CE

PF_6^-

F_6P^- Hexafluorophosphate ion L^-

Metal ion	Equilibrium	Log K 25°, 0	ΔH 25°, 0	ΔS 25°, 0
K^+	ML/M.L	0.38	$(-3)^r$	(-8)
	$M_2L_2/(ML)^2$	0.5		

[r] 25-50°, 0

Bibliography: 61RSS

AsF_6^-

F_6As^- Hexafluoroarsenate ion L^-

Metal ion	Equilibrium	Log K 25°, 0
K^+	ML/M.L	(0.25)

Bibliography: 60AH

H-O-O-H

H_2O_2 **Hydrogen peroxide** H_2L

Metal ion	Equilibrium	Log K 25°, 0.5	Log K 25°, 1.0	Log K 25°, 0	ΔH 25°, 0	ΔS 25°, 0
H^+	$H_2L/HL.H$		12.13[r]	11.65 ±0.03	-7.4[a]	29
	$H_4L_2/(H_2L)^2$		-0.96[r]			
	$H_4L_2/H_3L_2.H$		10.89[r]			
	$H_3L_2/H_2L_2.H$		13.86[r]			
Pu^{4+}	$M_2OHL.H^3/M^2.H_2L$	6.94				
	$M_2L_2.H^4/M^2.(H_2L)^2$	8.80				
UO_2^{2+}	MHL/H.ML(s)			-1.4		
	MOHL/OH.ML(s)			-2.0		
Fe^{3+}	MHL/M.HL	9.31[h]			(2)[s]	(50)[h]
TiO^{2+}	$MH_2L/M.H_2L$		3.86 ±0.0		-10.5[c]	-18[c]
		3.94[d]	4.01[e]			
	$M(H_2L)_2/M.(H_2L)^2$		6.3			
VO_2^+	VOL/M.H_2L		4.53[u]			
$HCrO_4^-$	$CrO_5/M.(H_2L)^2$	7.73[v]				
$Mo_2O_7^{2-}$	$MH_2L/M.H_2L$	3.42				
	$M(H_2L)_2.H^2/M.(H_2L)^2$	3.30				
$B(OH)_4^-$	$B(OH)_3HL/M.H_2L$	1.52		1.32		
	$B(OH)_2(HL)_2/M.(H_2L)^2$			1.53		
$GeO(OH)_3^-$	$M(H_2L)_2/M.(H_2L)^2$	1.68[a]				
$H_5TeO_6^-$	$MH_2L/M.H_2L$	-0.15[a]		-0.17		

[a] 25°, 0.1; [c] 25°, 1.0; [d] 25°, 2.1; [e] 25°, 3.2; [h] 20°, 0.1; [r] 5°, 3.0; [s] 8-40°, 0.1; [u] 22°, 1.0; [v] 10°, 0.09

Bibliography:

H^+ 49EU,57MRa,57SM,64CH
Pu^{4+} 49CM
UO_2^{2+} 58GT
Fe^{3+} 49EG
TiO^{2+} 60Gb,68VV,70VV
VO_2^+ 61Da
$HCrO_4^-$ 57E
$Mo_2O_7^{2-}$ 69AY
$B(OH)_4^-$ 53Eb,55Ab,55Kd
$GeO(OH)_3^-$ 60AR
$H_5TeO_6^-$ 59EF,61AT

Other references: 12J,23Ma,29Kb,37Ra, 51M,53EM,56TS,57BWa,57JS,59GJ,59Kd, 60Ca,60CLa,63DL,63FL,63LR,64BR,65BY, 670W

H_2S

H_2S Hydrogen sulfide (hydrosulfuric acid) H_2S

Metal ion	Equilibrium	Log K 20°, 0.1	Log K 25°, 1.0	Log K 25°, 0	ΔH 25°, 0	ΔS 25°, 0
H^+	HL/H.L		13.8	13.9 ±0.1	-12	23
	H_2L/HL.H	6.83	6.61	7.02 ±0.04	-5.3	14
	H_2L/H_2L(g)			-0.99		
Mn^{2+}	M.L/ML(s,pink)			-10.5		
	M.L/ML(s,green)			-13.5 ±0.0	5	-45
Fe^{2+}	M.L/ML(s)			-18.1 -0.1	10	-49
Co^{2+}	M.L/ML(s,α)			-21.3		
	M.L/ML(s,β)			-25.6		
Ni^{2+}	M.L/ML(s,α)			-19.4		
	M.L/ML(s,β)			-24.9		
	M.L/ML(s,γ)			-26.6		
Cu^{2+}	M.L/ML(s)			-36.1 ±0.2	35	-48
Cu^+	M^2.L/M_2L(s)			-48.5 -0.5	52	-48
Ag^+	MHL/M.HL	13.6	13.30[j]			
	$M(HL)_2/M.(HL)^2$	17.7	17.17[j]			
	MHL/ML.H	8.3				
	$M(HL)_2/MHL_2$.H	9.5				
	$M_2H_2L_3.H_2L/(M(HL)_2)^2$		3.2[j]			
	M^2.L/M_2L(s)		-49.7[j]	-50.1 ±0.0	66	-8
CH_3Hg^+	ML/M.L	21.0				
	M_2L/ML.M	16.3				
	M_3L/M_2L.M	7				
Tl^+	MHL/M.HL		2.27			
	M_2HL/MHL.M		5.77			
	$M_2OH(HL)_3/M^2.OH.(HL)^3$		14.96			
	$M_2(OH)_2(HL)_2/M^2.(OH)^2.(HL)^2$		16.70			
	M^2.L/M_2L(s)		-21.1	-21.2 +0.3		
Zn^{2+}	ML/M.OH.HL		19.0			
	M.L/ML(s,α)		-24.4	-24.7 ±0.0	20	-46
	M.L/ML(s,β)			-22.5		

[j] 20°, 1.0

Hydrogen sulfide (continued)

Metal ion	Equilibrium	Log K 20°, 0.1	Log K 25°, 1.0	Log K 25°, 0	ΔH 25°, 0	ΔS 25°, 0
Cd^{2}	MHL/M.HL		7.6			
	$M(HL)_2/M.(HL)^2$		14.6			
	$M(HL)_3/M.(HL)^3$		16.5			
	$M(HL)_4/M.(HL)^4$		18.9			
	M.L/ML(s)		-25.8	-27.0 ±0.1	25	-40
Hg^{2+}	$M(HL)_2/M.(HL)^2$		37.71[j]			
	$M(HL)_2/MHL_2.H$		6.19[j]			
	$MHL_2/ML_2.H$		8.30[j]			
	M.L/ML(s,black)		-51.0[j]	-52.7	63	-30
	M.L/ML(s,red)			-53.3		
Sn^{2+}	M.L/ML(s)			-25.9		
Pb^{2+}	M.L/ML(s)			-27.5 -0.6	31	-22
In^{3+}	$M^2.L^3/M_2L_3(s)$			-69.4		
Sb(III)	$(M(OH)_2)^2.L^3/M_2L_3(s)$			-90.8		
Bi^{3+}	$M^2.L^3/M_2L_3(s)$			-100 +1		

[j] 20°, 1.0

Bibliography:

H^+ 46K,52L,53KZ,58SG,59EGa,59Md,61LH, 61MSa,62Pc,66SW,67EM

Mn^{2+}-Cu^+,Sn^{2+},Pb^{2+},Bi^{3+} 53R,59C

Ag^+ 52GGF,53R,58SG,59C,66SW

CH_3Hg^+ 65SS

Tl^+ 53R,59KK,66GK,72GR

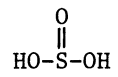
Zn^{2+} 53R,59C,67GSa

Cd^{2+} 53R,59C,64ST

In^{3+} 62TS

Sb(III) 52Lb,53R

Other references: OOP,OOWC,04A,06K,09BZ, 14TG,22JC,31K,32WM,33J,34ZR,38E,49KLa, 50SS,51Y,53A,56BL,56KR,57TMb,58Gb, 60ASc,60Bb,60MTF,60ZK,61EAa,63CMa, 62DGa,63Ca,64GM,64WSa,65D,66AD, 66KGS,67Gb,67GR,68HRa,71EGa,71G



H_2O_3S Hydrogen sulfite (sulfurous acid) H_2L

Metal ion	Equilibrium	Log K 25°, 0.5	Log K 25°, 1.0	Log K 25°, 0	ΔH 25°, 0	ΔS 25°, 0
H^+	HL/H.L	6.79[h]	6.34	7.18 ±0.03	(3)[r]	43
			6.36[e]			
	H_2L/HL.H	1.62[a]	1.37	1.91 ±0.02	4.0	22
			1.72[e]			
	H_2L/SO_2(g)		0.03	0.09	(-6)[s]	(-20)
			0.06[e]			
Ca^{2+}	M.L/ML(s)		-4.80	-6.5		
			-5.04[1]			
Ce^{3+}	ML/M.L			8.04		
Cu^+	ML/M.L		7.85			
	$ML_2/M.L^2$		8.7			
	$ML_3/M.L^3$		9.4			
Ag^+	ML/M.L	5.4[d]		5.60		
	$ML_2/M.L^2$	7.8[d]		8.68		
	$ML_3/M.L^3$			9.00		
	$M^2.L/M_2L$(s)			-13.82		
CH_3Hg^+	ML/M.L	8.11[h]				
Cd^{2+}	$ML_2/M.L^2$		4.2			
Hg^{2+}	$ML_2/M.L^2$		22.85[1]	24.07[n]		
	$ML_3/M.L^3$			25.96[n]		

[a] 25°, 0.1; [d] 25°, 2.0; [e] 25°, 3.0; [h] 20°, 0.1; [1] 18°, 3.0; [n] 18°, 0; [r] 10-50°, 0; [s] 25-50°, 0

Bibliography:

H^+ 12L,26SN,32RZ,34JL,37P,40Y,41TG,57CB, 58FN,58NR,63Sb,64AF,64DR,68SI,73KR
Ca^{2+} 58RB
Ce^{3+} 50MS
Cu^+ 55TSR
Ag^+ 55TSR,56CD
CH_3Hg^+ 65SS
Cd^{2+} 57T
Hg^{2+} 55TB
Other references: 04D,07KB,11J,19K,30CM, 30RH,31MM,32BR,32D,38BC,55Rb,56FP, 58Mc,59SY,60Ga,61EA,64DR,65FA,67ZO, 68LF,72BB

HSO_4^-

HO_4S^- Hydrogen sulfate ion (sulfuric acid) HL^-

Metal ion	Equilibrium	Log K 25°, 0.5	Log K 25°, 1.0	Log K 25°, 0	ΔH 25°, 0	ΔS 25°, 0
H^+	HL/H.L	1.32 ±0.06	1.10 ±0.08	1.99 ±0.01	5.4 ±0.3	27
		1.55[a]±0.05	1.01[d]±0.07	0.91[e]±0.02	5.6[c]	24[c]
Li^+	ML/M.L			0.64	0.0	3
Na^+	ML/M.L			0.70 ±0.05	1.1	7
K^+	ML/M.L	0.4[a]		0.85 ±0.1	3	14
NH_4^+	ML/M.L			1.11[n]		
Be^{2+}	ML/M.L	0.72[i]		1.95		
	$ML_2/M.L^2$		1.78			
	$ML_3/M.L^3$		2.08			
Mg^{2+}	ML/M.L		1.01[q]	2.23 ±0.02	1.4 ±0.1	15
Ca^{2+}	ML/M.L		1.03[q]	2.31 -0.01	1.6 ±0.1	16
	M.L/ML(s)		-2.92	-4.62 ±0.02	0.3	-20
			-3.16[e]			
Sr^{2+}	ML/M.L	1.14		2.55		
	M.L/ML(s)			-6.50 ±0.05	0.5	-28
Ba^{2+}	ML/M.L		0.66	2.7		
	$ML_2/M.L^2$		1.42			
	M.L/ML(s)			-9.96 ±0.03	5.5	-46
Ra^{2+}	M.L/ML(s)			-10.37[o]		
Sc^{3+}	ML/M.L	2.59		4.20	7.5	44
	$ML_2/M.L^2$	3.96		5.7	13	70
Y^{3+}	ML/M.L			3.47	4.8	32
		1.24[d]			4.0[d]	19[d]
	$ML_2/M.L^2$			5.3	7	48
		1.68[d]			5.5[d]	26[d]

[a] 25°, 0.1; [c] 25°, 1.0; [d] 25°, 2.0; [e] 25°, 3.0; [i] 18°, 0.5; [n] 18°, 0; [o] 20°, 0; [q] 25°, 0.7

Hydrogen sulfate ion (continued)

Metal ion	Equilibrium	Log K 25°, 0.5	Log K 25°, 1.0	Log K 25°, 0	ΔH 25°, 0	ΔS 25°, 0
La^{3+}	ML/M.L		1.43 ±0.03	3.64 ±0.02	4.4	31
		1.29[d]			3.7[d]	18[d]
	$ML_2/M.L^2$		2.46	5.29	5.7	43
Ce^{3+}	ML/M.L	1.77 ±0.02		3.59	4.6	32
		1.24[d]			4.3[d]	20[d]
	$ML_2/M.L^2$	2.90		5.2	6.2	45
Pr^{3+}	ML/M.L			3.62	4.7	32
		1.27[d]			3.9[d]	19[d]
	$ML_2/M.L^2$	1.88[d]		4.92	10.4	57
Nd^{3+}	ML/M.L			3.64	4.7	32
		1.26[d]			4.2[d]	19[d]
	$ML_2/M.L^2$	1.79[d]		5.1	8	50
Pm^{3+}	ML/M.L	1.34[d]			(4)[r]	(20)[d]
	$ML_2/M.L^2$	1.88[d]				
Sm^{3+}	ML/M.L			3.67 ±0.01	4.9	33
		1.30[d]			4.3[d]	20[d]
	$ML_2/M.L^2$	1.91[d]		5.2	7.0	47
Eu^{3+}	ML/M.L	1.87	1.54	3.67	4.9	33
		2.23[a]			3.9[d]	19[d]
		1.37[d]				
	$ML_2/M.L^2$	2.73	(2.69)	5.41	7.1	49
		1.96[d]			6.3[d]	30[d]
Gd^{3+}	ML/M.L	1.90		3.66	4.8	33
		1.33[d]			4.0[d]	20[d]
	$ML_2/M.L^2$	2.84		5.21	7.4	49
		1.75[d]			5.7[d]	27[d]
Tb^{3+}	ML/M.L			3.64	4.7	33
		1.27[d]			4.2[d]	20[d]
	$ML_2/M.L^2$			5.15	7.8	50
		1.89[d]			5.8[d]	28[d]

[a] 25°, 0.1; [d] 25°, 2.0; [r] 0-55°, 2.0

Hydrogen sulfate ion (continued)

Metal ion	Equilibrium	Log K 25°, 0.5	Log K 25°, 1.0	Log K 25°, 0	ΔH 25°, 0	ΔS 25°, 0
Dy^{3+}	ML/M.L			3.62	4.9	33
		1.23[d]			4.4[d]	20[d]
	$ML_2/M.L^2$			4.8	10	56
		1.72[d]			5.7[d]	27[d]
Ho^{3+}	ML/M.L			3.59	4.9	33
		1.24[d]			4.2[d]	20[d]
	$ML_2/M.L^2$			4.9	9	53
		1.76[d]			5.9[d]	28[d]
Er^{3+}	ML/M.L			3.59	4.9	33
		1.23[d]			4.2[d]	20[d]
	$ML_2/M.L^2$			5.1	8	50
		1.71[d]			5.7[d]	27[d]
Tm^{3+}	ML/M.L			3.59	4.8	33
		1.15[d]			4.2[d]	19[d]
	$ML_2/M.L^2$			5.14	7	47
		1.59[d]			5.2[d]	25[d]
Yb^{3+}	ML/M.L			3.58 ±0.02	4.7	32
		1.15[d]			4.1[d]	19[d]
	$ML_2/M.L^2$			5.2	7	47
		1.59[d]			5.3[d]	25[d]
Lu^{3+}	ML/M.L		1.29	3.52	4.7	32
		1.09[d]			4.2[d]	19[d]
	$ML_2/M.L^2$		1.9	5.3	6	44
		1.61[d]			5.8[d]	27[d]
Ac^{3+}	ML/M.L		1.20			
	$ML_2/M.L^2$		1.85			
Pu^{3+}	ML/M.L		1.26			
	$M(HL)_2/M.(HL)^2$		1.00			
Am^{3+}	ML/M.L	1.86	1.57			
		1.43[d]			(4)[s]	(20)[d]
	$ML_2/M.L^2$	2.82	2.66			
		1.85[d]				

[d] 25°, 2.0; [s] 0-55°, 2.0

Hydrogen sulfate ion (continued)

Metal ion	Equilibrium	Log K 25°, 0.5	Log K 25°, 1.0	Log K 25°, 0	ΔH 25°, 0	ΔS 25°, 0
Cm^{3+}	ML/M.L	1.86			(4)[s]	(20)[d]
		1.34[d]				
	$ML_2/M.L^2$	2.7				
		1.86[d]				
Cf^{3+}	ML/M.L	1.36[d]			(5)[s]	(20)[d]
	$ML_2/M.L^2$	2.07[d]				
Th^{4+}	ML/M.L	3.22[d]±0.01			5.0[d]	32[d]
	$ML_2/M.L^2$	5.53[d]±0.06			9.6[d]	58[d]
U^{4+}	ML/M.L	3.42[d]+0.1				
	$ML_2/M.L^2$	5.82[d]±0.07				
Np^{4+}	ML/M.L	3.51[d]-0.07	3.41[e]	3.53[m]		
	$ML_2/M.L^2$		5.42[e]	5.92[m]		
Pu^{4+}	ML/M.L		3.66			
Pa(V)	MOOHL/MOOH.L		2.21[e]			
UO_2^{2+}	ML/M.L	1.65[t]	1.81 ±0.0	2.95	5.0	30
					4.4[c]	24[c]
	$ML_2/M.L^2$		2.5 ±0.2	4.0	8.4[c]	41[c]
	$ML_3/M.L^3$		3.7[j]			
NpO_2^{2+}	ML/M.L	2.07	1.82[j]	3.27		
		2.20[a]				
	$ML_2/M.L^2$	3.4	2.62[j]			
		3.8[a]				
Mn^{2+}	ML/M.L			2.26 -0.02	2.1 ±0.1	17
Fe^{2+}	ML/M.L			2.2	1.6	15
Co^{2+}	ML/M.L		0.23[e]	2.36 +0.05	1.4 ±0.1	16
Ni^{2+}	ML/M.L	1.0[k]	0.57	2.32	1.5 -0.1	16
			0.26[e]			
	$ML_2/M.L^2$		1.42			

[a] 25°, 0.1; [c] 25°, 1.0; [d] 25°, 2.0; [e] 23°, 3.0; [j] 20°, 1.0; [k] 20°, 2.0; [m] 20°, 4.0 assuming HL/H.L = 0.83; [s] 0-55°, 2.0; [t] 25°, 2.7

Hydrogen sulfate ion (continued)

Metal ion	Equilibrium	Log K 25°, 0.5	Log K 25°, 1.0	Log K 25°, 0	ΔH 25°, 0	ΔS 25°, 0
Cu^{2+}	ML/M.L		0.95	2.36 ±0.03	2.1 ±0.4	18
			0.70[e]		1.7[d]	
	$M.(OH)^{1.5}.L^{0.25}/M(OH)_{1.5}L_{0.25}(s)$					
			-16.86[j]	-17.16 ±0.04	(8)[y]	(-50)
Ru^{2+}	ML/M.L	1.88[i]	1.70[j]	2.72[o]	(0)[v]	(10)
		1.30[k]				
V^{3+}	M./M.L		1.45			
Cr^{3+}	ML/M.L		2.60[x]			
Mn^{3+}	ML/M.L	1.20[t]	1.63[f]	1.90[g]		
Fe^{3+}	ML/M.L	2.24 ±0.1	2.02 ±0.1	4.04 ±0.1	(6)[w]	(30)[b]
			1.93[e]			
	$ML_2/M.L^2$		2.11[e]	5.38		
Ru^{3+}	ML/M.L	2.04[d]				
	$ML_2/M.L^2$	3.57[d]				
TiO^{2+}	ML/M.L		2.15[e]	2.5		
			2.26[f]	2.47[g]		
Zr^{4+}	ML/M.L	3.67[d]		3.68[m]		
	$ML_2/M.L^2$	6.40[d]		6.4[m]		
	$ML_3/M.L^3$	7.4[d]		7.5[m]		
Hf^{4+}	ML/M.L	3.04[d]				
	$ML_2/M.L^2$	5.44[d]				
VO^{2+}	ML/M.L			2.44 ±0.04	4.1	25
VO_2^+	ML/M.L		0.97[j]			
Ag^+	ML/M.L	0.31[d]	0.23[e]	1.3	1.5	11
	$ML_2/M.L^2$	0.19[d]	0.00[e]			
	$ML_3/M.L^3$	0.40[d]				
	$M^2.L/M_2L(s)$			-4.83 ±0.03	4.1	-8
Hg_2^{2+}	ML/M.L	1.30				
	$ML_2/M.L^2$	3.54				
	M.L/ML(s)		-4.46[e]	-6.13 ±0.04	1.3	-24

[b] 25°, 0.5; [d] 25°, 2.0; [e] 25°, 3.0; [f] 25°, 4.0; [g] 25°, 5.0; [i] 20°, 0.5; [j] 20°, 1.0; [k] 20°, 2.0; [m] 20°, 4.0, assuming HL/H.L = 0.83; [o] 20°, 0; [t] 23°, 2.7; [v] 20-35°, 0; [w] 1-35°, 0.5; [x] 48°, 1.0; [y] 25-75°, 0

Hydrogen sulfate ion (continued)

Metal ion	Equilibrium	Log K 25°, 0.5	Log K 25°, 1.0	Log K 25°, 0	ΔH 25°, 0	ΔS 25°, 0
Tl^{+}	ML/M.L			1.37 ±0.07	-0.2	6
Zn^{2+}	ML/M.L	0.93	0.89	2.38	1.5 ±0.1	16
		0.76[d]	0.70[e]			
	$ML_2/M.L^2$	1.9	1.2			
		1.2[d]	0.7[e]			
	$ML_3/M.L^3$		1.7			
		(1.1)[d]	0.9[e]			
	$ML_4/M.L^4$		1.7			
		1.4[d]	0.9[e]			
Cd^{2+}	ML/M.L	1.08	0.95	2.46	2.3 ±0.1	19
		0.86[d]	0.71[e] ±0.01		1.9[d]	10[d]
	$ML_2/M.L^2$	2.0	1.6			
		1.3[d]	0.9[e] ±0.1			
	$ML_3/M.L^3$	2.7	1.8			
		1.6[d]	1.0[e] ±0.1			
	$ML_4/M.L^4$		(2.3)			
		1.5[d]	1.0[e] ±0.1			
Hg^{2+}	ML/M.L	1.34				
	$ML_2/M.L^2$	2.4				
Pb^{2+}	ML/M.L		(0.74)[e]	2.75 -0.1		
	$ML_2/M.L^2$		1.99[e]			
	M.L/ML(s)		-6.20	-7.79 ±0.02	(3)[y]	(-26)
In^{3+}	ML/M.L	1.78[k]	1.85[j]			
	$ML_2/M.L^2$	1.88[k]	2.60[j]			
	$ML_3/M.L^3$	2.36[k]	3.00[j]			
Tl^{3+}	ML/M.L		2.27[e]		-2.7[e]	1[e]
Bi^{3+}	ML/M.L		1.98[e]		(3)[z]	(19)[e]
	$ML_2/M.L^2$		3.41[e]		(7)[z]	(39)[e]
	$ML_3/M.L^3$		4.08[e]		(11)[z]	(56)[e]
	$ML_4/M.L^4$		4.34[e]		(13)[z]	(64)[e]
	$ML_5/M.L^5$		4.60[e]			

[d] 25°, 2.0; [e] 25°, 3.0; [j] 20°, 1.0; [k] 20°, 2.0; [y] 0-50°, 0; [z] 15-65°, 3.0

Hydrogen sulfate ion (continued)

Bibliography:

H^+ 10NS,37P,40S,51M,51ZA,52DJ,54S,55ER, 56R,58NNa,59Z,61RS,62AMa,63DS,62YI,63RE, 64F,65KYa,66CI,66MJ,66VL,67VLe,68Aba, 69ZL,71AKa,71EM,72CG,73CD,73P,73S,74T

Li^+-K^+ 30RD,50JM,62AMa,66CL,68TH,69IE,74MV

NH_4^+ 31BR

Be^{2+} 62BK,66KW,67SSa

Mg^{2+} 27D,40MS,51DJ,58NN,66AP,68KP,69IEa,70L, 73AM,73HP,73P

Ca^{2+} 32MD,33LHS,53BG,58NR,69KP,70GG,70L,73A, 74MVa

Sr^{2+} 23B,56SZ,68CS

Ba^{2+} 10M,23B,33LHS,40CB,58R,60T,65L,66SSH

Ra^{2+} 33NT

Sc^{3+}-Lu^{3+} 30Da,50JM,51CM,51M,54SJ,62Bc,62MM, 65Sa,66AM,66AMa,66AP,67CC,67FD,67KI, 68ALN,69IEa,72HS,73FP,74Pa

Ac^{3+} 68SMR

Pu^{3+} 67NR

Am^{3+}-Cf^{3+} 65Sa,67CC,68ALN

Th^{4+} 51ZA,59Z

U^{4+} 52SH,55DW

Np^{4+} 54SH,62ST,63Ma,66AB

Pu^{4+} 51RL

Pa(V) 66Ga

UO_2^{2+} 49BM,51A,57DM,60Mb,71AKa,71BL

NpO_2^{2+} 68ABa,70AWa

Mn^{2+}-Cu^{2+} 27D,38OG,47J,49NT,50F,51NL,56BD, 58BB,58Sb,59NN,60BB,61PF,61TO,63TS, 65SMb,68MM,69BG,69IEa,70L,70MM,73AM, 73HP,73P

Ru^{2+} 66VL,67VLc

V^{3+} 72KMN

Cr^{3+} 62FT

Mn^{3+} 73GT

Fe^{3+} 53WD,59M,60K,62DS,63W,67M,73NP

Ru^{3+} 68LK

TiO^{2+} 69VV

Zr^{4+} 49CMa,63AK,69N

Hf^{4+} 63Pa,65DK,67EME

VO^{2+} 63SW,66KW,71BL

VO_2^+ 66I

Ag^+ 30RD,43VM,52L,54TO,60SL,65HWa, 67CC,67LH

Hg_2^{2+} 46IS,53L,57BL,70SP

Tl^+ 30BD,30RD,53BG

Zn^{2+} 27D,58NN,69IEa,70L,71FCK,73AM, 73FC,73HP,73P

Cd^{2+} 27D,69BG,69IEa,70L,71FCK,71FCM, 73FC,73P

Hg^{2+} 46IS,57PT

Pb^{2+} 31CL,31LP,34L,46TM,53L,55S,60RKa, 61RS,70GNa,72BH

In^{3+} 54S,54Sc,66DR,68AL

Tl^{3+} 67MK

Bi^{3+} 71FK

Other references: 03B,07P,29B,30LM,32HJ, 32MD,38D,41L,42Nc,50N,52F,52JM,52S, 53CT,53Na,53NA,53SK,54BB,54D,54DP, 54K,54NK,54Se,55LR,56HD,56Ka,57BM, 57K, 58Aa,58Ja,58KV,58MF,59K,59Ka, 59PL,59WL,60C,60H,60LP,60LS,60PB, 61BT,61HA,61MC,61S,62AY,62BS,62BW, 62ET,62JP,62NA,62RE,63AM,63BL,62Hc, 63KV,63LM,63NP,63TU,63VRa,64BM,64BP, 64LP,65AK,65HS,65LB,65NT,65P,64T, 66BA,66E,66Fa,66MB,66MS,66NH,66S, 67LN,67Ma,67VLd,67W,68M,68N,68P, 68PS,68WSa,69BMN,69FP,69MN,69NPa, 69PK,69RP,69SPa,69SS,69VS,69YM,70M, 70PH,70TR,71MD,71MKA,72MC,72TSa,73Ab, 73IVa,73PR,73PRa,73RM,74FP,74HI,74MC, 74MS

$H_2S_2O_3$

$H_2O_3S_2$ Hydrogen thiosulfate (thiosulfuric acid) H_2L

Metal ion	Equilibrium	Log K 25°, 0.5	Log K 25°, 1.0	Log K 25°, 0	ΔH 25°, 0	ΔS 25°, 0
H^+	HL/H.L	1.0	0.8	1.6 ±0.1		
		1.3[a]				
	H_2L/HL.H			0.6		
Na^+	ML/M.L	0.04		0.53 ±0.05	1.1[b]	4[b]
K^+	ML/M.L	0.28		0.96 ±0.04	2.0[b]	8[b]
Mg^{2+}	ML/M.L	0.56		1.82 ±0.03	0.4[b]	4[b]
Ca^{2+}	ML/M.L	0.70		1.98 ±0.07	0.6[b]	5[b]
Sr^{2+}	ML/M.L			2.04		
Ba^{2+}	ML/M.L			2.27 ±0.06	2.6	19
	M.L/ML(s)			-4.79		
La^{3+}	ML/M.L		0.8	2.99		
Mn^{2+}	ML/M.L	0.67		1.95	0.5[b]	5[b]
Co^{2+}	ML/M.L	0.77		2.05	0.5[b]	5[b]
Ni^{2+}	ML/M.L	0.78		2.06	0.4[b]	5[b]
Fe^{3+}	ML/M.L	1.98[a]	1.18[r]			
Cu^+	ML/M.L		10.35[s]			
	$ML_2/M.L^2$		12.27[s]			
	$ML_3/M.L^3$		13.71[s]			
Ag^+	ML/M.L			8.82[o]		
				7.36[f]		
	$ML_2/M.L^2$		12.63	13.67[o]	-19	-2
		12.78[d]		12.72[f]		
	$ML_3/M.L^3$		12.8	14.2[o]		
		13.1[d]		13.5[f]		
	$M_2L_4/M^2.L^4$			26.3[f]		
	$M_3L_5/M^3.L^5$			39.8[f]		
	$M_6L_8/M^6.L^8$			78.6[f]		
CH_3Hg^+	ML/M.L	10.75[a]			-11.7[h]	10[a]

[a] 25°, 0.1; [b] 25°, 0.5; [d] 25°, 2.0; [f] 25°, 4.0; [h] 20°, 0.1; [o] 20°, 0; [r] 18°, 1.0; [s] 25°, 1.6

Hydrogen thiosulfate (continued)

Metal ion	Equilibrium	Log K 25°, 0.5	Log K 25°, 1.0	Log K 25°, 0	ΔH 25°, 0	ΔS 25°, 0
Tl^{+}	ML/M.L			0.86[f]		
	$ML_2/M.L^2$			0.72[f]		
	$ML_3/M.L^3$			0.2[f]		
	$M_2L_4/M^2.L^4$			2.54[f]		
	$M^2.L/M_2L(s)$			-4.54[f]		
Zn^{2+}	ML/M.L	(1.12)	(0.62)	2.35 ±0.06	3.1	21
			0.96[e]		2.2[b]	(13)[b]
	$ML_2/M.L^2$		1.94[e]			
	$ML_3/M.L^3$		3.3[e]			
	$M_2L_2/M^2.L^2$		5.84[e]			
Cd^{2+}	ML/M.L	3.2[u]	2.82	3.92 ±0.03	1.3	22
			2.74[e] ±0.00		0.0[b]	15[b]
	$ML_2/M.L^2$		4.57	6.3 ±0.1	-1.5[c]	16[c]
			4.70[e] ±0.05			
	$ML_3/M.L^3$		6.4		-3.4[c]	18[c]
			6.9[e] ±0.1			
	$ML_4/M.L^4$		7.1[e]			
	$M_2L_2/M^2.L^2$		11.18[e]			
Hg^{2+}	$ML_2/M.L^2$		(29.93)	29.23 ±0.05		
	$ML_3/M.L^3$		(33.26)	30.6 ±0.3	-38.5[c]	(23)[c]
Pb^{2+}	ML/M.L		2.42[e]			
	$ML_2/M.L^2$		4.86[e]			
	$ML_3/M.L^3$		6.2[e]			
	$ML_4/M.L^4$		6.2[e]			

[b] 25°, 0.5; [c] 25°, 1.0; [e] 25°, 3.0; [f] 25°, 4.0; [u] 30°, 0.1

Bibliography:

H^{+} 42YH,51DM,53Pb

Na^{+}-Ba^{2+} 49DW,51DM,55GM,74Aa

La^{3+} 51M,64BM

Mn^{2+}-Ni^{2+} 51DM,74Aa

Fe^{3+} 30S,57MN

Cu^{+} 55TSL

Ag^{+} 46OA,53CP,54W,57CHP,58N,67BP

CH_3Hg^{+} 65SS

Tl^{+} 58Na

Zn^{2+} 51DM,55GM,70P,74Aa,74MS

Cd^{2+} 51DM,55GM,56Y,57YG,59MG,65HS,70P,74Aa,

Hg^{2+} 54T,61NS,70MSS,74Kb

Pb^{2+} 59DP

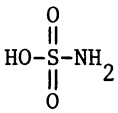
Other references: 11J,31CR,49Ba,53J,54NS, 54P,56A,56NM,57KP,57NM,57T,58D,58SW, 59Pb,59SD,64CL,68GF,68JG,72PR

$SeSO_3^{2-}$

O_3SSe^{2-} Selenosulfate ion L^{2-}

Metal ion	Equilibrium	Log K 25°, 1.0
Hg^{2+}	$ML_2/M.L^2$	36.8

Bibliography: 57T



H_3O_3NS Hydrogen amidosulfate (sulfamic acid) HL

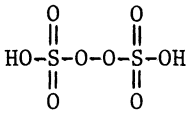
Metal ion	Equilibrium	Log K 25°, 2.0	Log K 25°, 0	ΔH 25°, 0	ΔS 25°, 0
H^+	HL/H.L		0.988	-0.25	3.7
	H.L/HL(s)		-0.92		
Pu^{4+}	ML/M.L	0.11			

Bibliography:

H^+ 52KK,65HW,68C

Pu^{4+} 68C

Other references: 55HB,58Sc,58Sd,59S, 65HSE



$H_2O_8S_2$ Hydrogen peroxodisulfate (peroxodisulfuric acid) H_2L

Metal ion	Equilibrium	Log K 25°, 0.1	Log K 25°, 0	ΔH 25°, 0	ΔS 25°, 0
K^+	ML/M.L	0.52	0.92	(2)[r]	(11)

[r] 25-39°, 0

Bibliography: 66CL

H_2Se

H_2Se Hydrogen selenide (hydroselenic acid) H_2L

Metal ion	Equilibrium	Log K 25°, 1.0	Log K 25°, 0
H^+	HL/H.L	(11.6)	15.0[o]
	H_2L/HL.H	3.48	3.89
Mn^{2+}	ML/M.OH.HL	8.0	
	M.L/ML(s)	-12.1	(-11.5)
Fe^{2+}	M.L/ML(s)		(-26.0)
Co^{2+}	M.L/ML(s)		(-31.2)
Ni^{2+}	M.L/ML(s)		(-32.7)
Cu^{2+}	M.L/ML(s)		(-48.1)
Cu^+	M^2.L/M_2L(s)		(-60.8)
Ag^+	M_2L/M^2.OH.HL	48.5	
	$MOHL_2$/M.OH.L^2	24.1	
	M^2.L/M_2L(s)	-53.8	(-63.7)
Tl^+	M^2.L/M_2L(s)		(-33.1)
Zn^{2+}	M.L/ML(s)		(-29.4)
Cd^{2+}	M.L/ML(s)		(-35.2)
Hg^{2+}	ML/M.OH.HL	51.2	
	ML_2/M.$(OH)^2$.$(HL)^2$	61.0	
	MHL_2/M.OH.$(HL)^2$	52.8	
	M.L/ML(s)	-56.6	(-64.5)
Sn^{2+}	M.L/ML(s)		(-38.4)
Pb^{2+}	M.L/ML(s)		(-42.1)

[o] 22°, 0

Bibliography:

H^+ 41Ha,58W,70MG

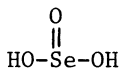
Mn^{2+} 64BU,70MGa

Fe^{2+}-Cu^+,Tl^+,Zn^{2+},Sn^{2+},Pb^{2+} 64BU

Ag^+ 64BU,70MG

Hg^{2+} 64BU,71MG

Other references: 13B,23Ha,42L,48LN,57W



H_2O_3Se Hydrogen selenite (selenous acid) H_2L

Metal ion	Equilibrium	Log K 25°, 0.3	Log K 25°, 1.0	Log K 25°, 0	ΔH 25°, 0	ΔS 25°, 0
H^+	HL/H.L	7.94	7.78		-1.20[c]	31.6[c]
			8.05[e]		-1.26[e]	32.6[e]
	$H_2L/HL.H$	2.35	2.27		1.5[c]	15[c]
			2.61[e]		1.3[e]	16[e]
	$H_2L_2/(HL)^2$	1.6	0.17		1.2[c]	5[c]
			-0.61[e]		-0.9[e]	-6[e]
	$H_2L_2/HL_2.H$	8.0	7.7		-0.6[c]	33[c]
			7.70[e]		-1.1[e]	32[e]
	$H_3L_2/H_2L_2.H$	2.8	2.97		1.3[c]	18[c]
			3.53[e]		1.4[e]	21[e]
	$H_4L_2/H_3L_2.H$	2.4	2.10		1.5[c]	15[c]
			1.89[e]		-0.1[e]	8[e]
Mg^{2+}	$M.L/ML(H_2O)_6(s)$			-5.36[o]		
Sr^{2+}	M.L/ML(s)			-6.10[o]		
Ba^{2+}	M.L/ML(s)			-6.57		
Mn^{2+}	M.L/ML(s)			-7.27[o]		
Co^{2+}	M.L/ML(s)			-7.08[o]		
Cu^{2+}	$M.L/ML(H_2O)_2(s)$			-7.78[o]		
Fe^{3+}	MHL/M.HL		2.81		(6)[r]	(30)[c]
Ag^+	ML/M.L		2.4			
	$ML_2/M.L^2$		3.76			
	$M^2.L/M_2L(s)$			-15.55	10.7	-35
Cd^{2+}	$ML_2/M.L^2$		5.1			
Hg^{2+}	$ML_2/M.L^2$		12.5			
	M.L/ML(s)		-13.82			

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[c] 25°, 1.0; [e] 25°, 3.0; [o] 20°, 0; [r] 20-40°, 1.0

Hydrogen selenite (continued)

Bibliography:

H^+ 66SC,71BSa,72AB

Mg^{2+} 66LSa

Sr^{2+} 63SL

Ba^{2+} 65LA

Mn^{2+} 66LS

Co^{2+} 64SLM

Cu^{2+} 65LS

Fe^{3+} 65HI

Ag^+ 62SLK,69MG

Cd^{2+},Hg^{2+} 57T

Other references: 09RP,20B,21RK,31BR, 32BR,33R,39Ha,52Lb,57KC,59Me,61LPa, 66PD,67KM,68RV,68SI

$HSeO_4^-$

HO_4Se^- Hydrogen selenate ion (selenic acid) HL^-

Metal ion	Equilibrium	Log K 25°, 0.5	Log K 25°, 1.0	Log K 25°, 0	ΔH 25°, 0	ΔS 25°, 0
H^+	HL/H.L			1.70 ±0.05	5.6 ±0.1	27
Ca^{2+}	M.L/ML(s)			-3.09	-2.0	-21
Sr^{2+}	M.L/ML(s)			-4.40	0.1	-20
Ba^{2+}	M.L/ML(s)			-7.46	5.4	-16
Sc^{3+}	ML/M.L	1.78			(-2)[r]	(1)[b]
	$ML_2/M.L^2$	2.64				
Mn^{2+}	ML/M.L			2.43	3.5	23
Co^{2+}	ML/M.L			2.70	2.9	22
Ni^{2+}	ML/M.L			2.67	3.5	23
Ag^+	$M^2.L/M_2L$(s)			-8.91	(-10.4)	(-76)
Tl^+	$M^2.L/M_2L$(s)			-4.00	(10.3)	(16)
Zn^{2+}	ML/M.L		0.73	2.19		
	$ML_2/M.L^2$		1.35			
Cd^{2+}	ML/M.L			2.27		
Pb^{2+}	M.L/ML(s)			-6.84	3.8	-19

[b] 25°, 0.5; [r] 25-45°, 0.5

Bibliography:

H^+ 64Na,65CD,70GN,74MBa
Ca^{2+} 59SS
Sr^{2+} 59SZ,63Sc
Ba^{2+} 58SSa,59SK
Mn^{2+}-Ni^{2+} 70GN
Sc^{3+} 67KI
Ag^+ 59SZF
Tl^+ 58Sa
Zn^{2+} 34Ba,74MS
Cd^{2+} 34Ba
Pb^{2+} 55Sb,59SK
Other references: 42GK,50PA,53SKa,59Ba, 68WSa

H_2Te

H_2Te Hydrogen telluride (hydrotelluric acid) H_2L

Metal ion	Equilibrium	Log K 25°, 0
Mn^{2+}	M.L/ML(s)	(-15.9)
Fe^{2+}	M.L/ML(s)	(-30.0)
Co^{2+}	M.L/ML(s)	(-37.4)
Ni^{2+}	M.L/ML(s)	(-38.1)
Cu^{+}	$M^2.L/M_2L(s)$	(-62.3)
Ag^{+}	$M^2.L/M_2L(s)$	(-71.7)
Tl^{+}	$M^2.L/M_2L(s)$	(-39.2)
Zn^{2+}	M.L/ML(s)	(-33.3)
Cd^{2+}	M.L/ML(s)	(-41.5)
Hg^{2+}	M.L/ML(s)	(-69.6)
Sn^{2+}	M.L/ML(s)	(-44.7)
Pb^{2+}	M.L/ML(s)	(-46.3)

Bibliography: 64BU

Other references: 13B,23Ha,48LN,52Lb, 63Pb

$Te(OH)_4$

H_4O_4Te Hydrogen tellurite (tellurous acid) H_2L

Metal ion	Equilibrium	Log K 25°, 0.5	Log K 25°, 1.0	Log K 25°, 0
H^+	HL/H.L	9.00	8.60	
		9.36[a]		
Ag^+	$M^2.L/M_2L(s)$			-2.43

[a] 25°, 0.1

Bibliography:

H^+ 73NS

Ag^+ 65GP

Other references: 20B,24K,25S,54IA,56DZb, 68NKa,68SI,71BG,71GB,74MB,74NK

HF

HF Hydrogen fluoride (hydrofluoric acid) HL

Metal ion	Equilibrium	Log K 25°, 0.5	Log K 25°, 1.0	Log K 25°, 0	ΔH 25°, 0	ΔS 25°, 0
H^+	HL/H.L	2.93 ±0.02	2.96 ±0.02	3.17 ±0.01	3.20 ±0.02	25.3
		2.92[a]±0.03			2.89[c]±0.03	23.3[c]
		3.13[d]±0.02	3.30[e]±0.02			
	HL_2/HL.L	0.59 ±0.02	0.59 ±0.1	0.5 ±0.1	1.0	5
			0.86[e]±0.2		0.9[c] ±0.1	6[c]
Li^+	M.L/ML(s)			-2.77	1.1	-9
Be^{2+}	ML/M.L	4.71	4.99		(0)[s]	(20)[c]
		4.99[k]				
	$ML_2/M.L^2$	8.32	8.80		(-1)[s]	(40)[c]
		8.78[k]				
	$ML_3/M.L^3$	11.1	11.6		(-2)[s]	(40)[c]
		11.7[k]				
	$ML_4/M.L^4$	13.4[k]	13.1		(-2)[s]	(50)[c]
Mg^{2+}	ML/M.L	1.31 ±0.01	1.32 ±0.06	1.8	3.2[c]	17[c]
		1.46[a]				
	$M.L^2/ML_2$(s)			-8.18	(-2)[r]	(-40)
Ca^{2+}	ML/M.L	0.6 ±0.1	0.58 ±0.05	1.1	3.5[c]	15[c]
	$M.L^2/ML_2$(s)			-10.41	(4)[r]	(-30)
Sr^{2+}	ML/M.L		0.1 ±0.1		4[c]	14[c]
	$M.L^2/ML_2$(s)			-8.54	(1)[r]	(-40)
Ba^{2+}	ML/M.L		-0.3 ±0.1		(4)[t]	(12)[c]
	$M.L^2/ML_2$(s)			-5.76	(1)[r]	(-20)
Sc^{3+}	ML/M.L	6.18 ±0.01		7.1	(0)[u]	(30)[b]
	$ML_2/M.L^2$	11.46 ±0.02		12.9	(-1)[u]	(50)[b]
	$ML_3/M.L^3$	15.5 ±0.0		17.4	(-2)[u]	(60)[b]
	$ML_4/M.L^4$	18.4 +0.1		20.3		
Y^{3+}	ML/M.L	3.90 ±0.03	3.60	4.8	8.3[c]	44[c]
	$ML_2/M.L^2$	7.13 ±0.03		8.5		
	$ML_2/M.L^3$	10.3 ±0.0		12.1		

[a] 25°, 0.1; [b] 25°, 0.5; [c] 25°, 1.0; [d] 25°, 2.0; [e] 25°, 3.0; [k] 20°, 2.0; [r] 0-27°, 0; [s] 0-60°, 1.0; [t] 15-60°, 1.0; [u] 15-35°, 0.5

Hydrogen fluoride (continued)

Metal ion	Equilibrium	Log K 25°, 0.5	Log K 25°, 1.0	Log K 25°, 0	ΔH 25°, 0	ΔS 25°, 0
La^{3+}	ML/M.L	2.69 ±0.01	2.67	3.6	4.0[c]	26[c]
Ce^{3+}	ML/M.L	3.13	2.81	4.0	4.8[c]	29[c]
Pr^{3+}	ML/M.L		3.01		5.7[c]	33[c]
Nd^{3+}	ML/M.L		3.09		6.8[c]	37[c]
Pm^{3+}	ML/M.L		(3.16)			
Sm^{3+}	ML/M.L		3.12		9.4[c]	46[c]
Eu^{3+}	ML/M.L	3.40 -0.01	3.19		9.2[c]	45[c]
Gd^{3+}	ML/M.L	3.40 ±0.03	3.31	4.3	8.9[c]	45[c]
Tb^{3+}	ML/M.L		3.42		7.5[c]	41[c]
Dy^{3+}	ML/M.L		3.46		7.0[c]	39[c]
Ho^{3+}	ML/M.L		3.52		7.3[c]	40[c]
Er^{3+}	ML/M.L		3.54		7.4[c]	41[c]
Tm^{3+}	ML/M.L		3.56		8.7[c]	45[c]
Yb^{3+}	ML/M.L		3.58		9.6[c]	48[c]
Lu^{3+}	ML/M.L		3.61		9.5[c]	48[c]
Ac^{3+}	ML/M.L	2.72				
	$ML_2/M.L^2$	5.22				
	$ML_3/M.L^3$	7.9				
Am^{3+}	ML/M.L	3.39				
	$ML_2/M.L^2$	6.11				
	$ML_3/M.L^3$	9.0				
Cm^{3+}	ML/M.L	3.34				
	$ML_2/M.L^2$	6.18				
	$ML_3/M.L^3$	9.1				

[c] 25°, 1.0

Hydrogen fluoride (continued)

Metal ion	Equilibrium	Log K 25°, 0.5	Log K 25°, 1.0	Log K 25°, 0	ΔH 25°, 0	ΔS 25°, 0
Th^{4+}	ML/M.L	7.59 ±0.04	7.80[e]	8.44 ±0.2	(-1)[r]	(40)
				8.2[m]		
	$ML_2/M.L^2$	13.44 ±0.02	13.82[e]	15.08 ±0.2	(-2)[r]	(70)
				14.7[m]		
	$ML_3/M.L^3$	17.9	18.8[e]	19.8 ±0.4	(-3)[r]	(90)
	$ML_4/M.L^4$			23.2	(-4)[r]	(100)
	$M.L^4/ML_4(s)$		-28.3[e]			
Pa^{4+}	ML/M.L		8.03[e]			
	$ML_2/M.L^2$		14.86[e]			
U^{4+}	ML/M.L			9.0[m]		
	$ML_2/M.L^2$			15.7[m]		
	$ML_3/M.L^3$			21.2[m]		
Np^{4+}	ML/M.L			8.3[m]		
	$ML_2/M.L^2$			14.5[m]		
	$ML_3/M.L^3$			20.3[m]		
	$ML_4/M.L^4$			25.1[m]		
Pu^{4+}	ML/M.L		6.77			
Pa(V)	$MOL/M(OH)_3.HL$		3.56[e]			
	$MOL/_2MOL.L$		7.39[e]			
	$MOL_3/MOL_2.L$		6.56[e]			
UO_2^{2+}	ML/M.L	4.3	4.54 -0.1		0.4[c]	22[c]
		4.55[d]		5.0[f]		
	$ML_2/M.L^2$		7.97 -0.08		0.5[c]	38[c]
	$ML_3/M.L^3$		10.55 -0.09		0.6[c]	51[c]
	$ML_4/M.L^4$		12.0 -0.2		0.1[c]	55[c]
NpO_2^{2+}	ML/M.L	4.04	3.85[j]	4.6		
		4.12[a]				
	$ML_2/M.L^2$	7.00	6.97[j]			
		7.01[a]				
Mn^{2+}	ML/M.L		0.7 ±0.1			
Fe^{2+}	ML/M.L		0.8			

[a] 25°, 0.1; [c] 25°, 1.0; [d] 25°, 2.0; [e] 25°, 3.0; [f] 25°, 4,0, assuming HL/H.L = 3.5; [j] 20°, 1.0; [m] 20°, 4.0 H^+, assuming HL/H.L = 3.5; [r] 5-45°, 0

Hydrogen fluoride (continued)

Metal ion	Equilibrium	Log K 25°, 0.5	Log K 25°, 1.0	Log K 25°, 0	ΔH 25°, 0	ΔS 25°, 0
Co^{2+}	ML/M.L		0.4			
Ni^{2+}	ML/M.L		0.5 ±0.1			
Cu^{2+}	ML/M.L	(0.7)	0.9 ±0.1	(1.2)	(1)[t]	(7)[b]
Cr^{3+}	ML/M.L	4.36		5.2		
	$ML_2/M.L^2$	7.70				
	$ML_3/M.L^3$	10.2				
Mn^{3+}	ML/M.L	5.65[d]				
Fe^{3+}	ML/M.L	5.18 ±0.04	5.18	6.0	2.3[b]	31[b]
	$ML_2/M.L^2$	9.13 ±0.04	9.07		3.5[b]	54[b]
	$ML_3/M.L^3$	11.9 ±0.1	12.1		4.4[b]	69[b]
VO^{2+}	ML/M.L		3.37 -0.09		1.9[c]	22[c]
	$ML_2/M.L^2$		5.74 -0.3		3.5[c]	38[c]
	$ML_3/M.L^3$		7.29 -0.2		4.9[c]	50[c]
	$ML_4/M.L^4$		8.1 -0.7		6.4[c]	59[c]
Zr^{4+}	ML/M.L			9.8		
		8.94[d]		9.4[m]		
	$ML_2/M.L^2$	16.4[d]		17.2[m]		
	$ML_3/M.L^3$	22.4[d]		23.7[m]		
	$ML_4/M.L^4$			29.5[m]		
	$ML_5/M.L^5$			23.5[m]		
	$ML_6/M.L^6$			28.3[m]		
Hf^{4+}	ML/M.L			9.0[m]		
	$ML_2/M.L^2$			16.5[m]		
	$ML_3/M.L^3$			23.1[m]		
	$ML_4/M.L^4$			28.8[m]		
	$ML_5/M.L^5$			34.0[m]		
	$ML_6/M.L^6$			38.0[m]		
VO_2^+	ML/M.L			3.04[j]		
	$ML_2/M.L^2$			5.60[j]		
	$ML_3/M.L^3$			6.9[j]		
	$ML_4/M.L^4$			7.0[j]		

[b] 25°, 0.5; [c] 25°, 1.0; [d] 25°, 2.0; [j] 20°, 1.0; [m] 20°, 4.0 H^+, assuming HL/H.L = 3.5;
[t] 15-35°, 0.5

Hydrogen fluoride (continued)

Metal ion	Equilibrium	Log K 25°, 0.5	Log K 25°, 1.0	Log K 25°, 0	ΔH 25°, 0	ΔS 25°, 0
$Nb(OH)_2^{3+}$	$ML_5/ML_4.L$		2.51[e]			
Ag^+	ML/M.L	-0.17	-0.32	0.4	(-3)[s]	(-10)[b]
CH_3Hg^+	ML/M.L	1.50[h]				
Tl^+	ML/M.L			0.10		
$(CH_3)_3Sn^+$	ML/M.L		2.28			
	$ML_2/M.L^2$		2.89			
$(CH_3)_3Pb^+$	ML/M.L		0.81			
$(C_2H_5)_3Pb^+$	ML/M.L		0.54			
Zn^{2+}	ML/M.L	0.73	0.78 ±0.03	1.15	3.8	18
			0.8[e]		2.0[c]	10[c]
					1.8[e]	10[e]
Cd^{2+}	ML/M.L		0.46		1.2[c]	6[c]
			0.57[e]		1.0[e]	6[e]
	$ML_2/M.L^2$		0.53		0.5[c]	4[c]
			0.85[e]			
Hg^{2+}	ML/M.L	1.03		1.6	(1)[s]	(8)[b]
Sn^{2+}	ML/M.L		4.08			
	$ML_2/M.L^2$		6.68			
	$ML_3/M.L^3$		9.5			
$(CH_3)_2Sn^{2+}$	ML/M.L		3.70			
	$ML_2/M.L^2$		6.57			
	$ML_3/M.L^3$		8.0			
Pb^{2+}	ML/M.L	1.26[d]	1.44 ±0.04			
	$ML_2/M.L^2$	2.55[d]	2.54			
	$M.L^2/ML_2(s)$	-6.60[d]	-6.26	-7.44	(5)[r]	(-20)[d]
$(CH_3)_2Pb^{2+}$	ML/M.L		1.73			
$(C_2H_5)_2Pb^{2+}$	ML/M.L		1.54			
$(C_3H_7)_2Pb^{2+}$	ML/M.L		1.61			

[b] 25°, 0.5; [c] 25°, 1.0; [d] 25°, 2.0; [e] 25°, 3.0; [h] 20°, 0.1; [r] 9-27°, 0; [s] 15-35°, 0.5

Hydrogen fluoride (continued)

Metal ion	Equilibrium	Log K 25°, 0.5	Log K 25°, 1.0	Log K 25°, 0	ΔH 25°, 0	ΔS 25°, 0
B(III)	$M(OH)_3L/M(OH)_3.L$		-0.30			
	$M(OH)_2L_2.OH/M(OH)_3.L^2$		-6.27			
	$MOHL_3.(OH)^2/M(OH)_3.L^3$		-14.2			
	$ML_4.(OH)^3/M(OH)_3.L^4$		-21.6			
Al^{3+}	ML/M.L	6.11 ±0.03	6.09	7.0	0.7[c]	30[c]
		6.43[a] ±0.03			1.1[a]	33[a]
	$ML_2/M.L^2$	11.12 ±0.1		12.6		
		11.63[a] ±0.04			2.0[a]	60[a]
	$ML_3/M.L^3$	15.0 ±0.3		16.7		
		15.5[a] ±0.0			2.2[a]	78[a]
	$ML_4/M.L^4$	18.0 ±0.8		19.1		
		18.3[a] ±0.4			2.2[a]	91[a]
	$ML_5/M.L^5$	19.4			1.8[a]	97[b]
	$ML_6/M.L^6$	19.8				
Ga^{3+}	ML/M.L	4.49	4.38	5.9	2.5[c]	28[c]
	$ML_2/M.L^2$	8.00				
	$ML_3/M.L^3$	10.5				
In^{3+}	ML/M.L	3.75	3.70 ±0.03	4.6	2.6	30
		3.74[d]			2.2[c] ±0.0	24[c]
	$ML_2/M.L^2$	6.5 ±0.1	6.4 ±0.1	8.1	5	50
		6.6[d]			3[c] ±1	40[c]
	$ML_3/M.L^3$	8.6	8.6 ±0.0	10.3	7	70
		9.0[d]			5[c] ±2	60[c]
	$ML_4/M.L^4$	9.9	9.8 +0.1	11.5	9	80
		10.3[d]			8[c]	70[c]
CH_3Sn^{3+}	ML/M.L	5.10				
	$ML_2/M.L^2$	9.85				
	$ML_3/M.L^3$	14.0				
	$ML_4/M.L^4$	17.1				
	$ML_5/M.L^5$	19.3				

[a] 25°, 0.1; [b] 25°, 0.5; [c] 25°, 1.0; [d] 25°, 2.0

Hydrogen fluoride (continued)

Metal ion	Equilibrium	Log K 25°, 0.5	Log K 25°, 1.0	Log K 25°, 0	ΔH 25°, 0	ΔS 25°, 0
Sb^{3+}	ML/M.L	3.0[v]				
	$ML_2/M.L^2$	5.7[v]				
	$ML_3/M.L^3$	8.3[v]				
	$ML_4/M.L^4$	10.9[v]				
Bi^{3+}	ML/M.L	1.42[v]				
Ge(IV)	$ML_4/M(OH)_4.(HL)^4$	7.30				
	$MHL_5/M(OH)_4.(HL)^5$	8.94				

[v] 30°, 2.0

Bibliography:

H^+ 42B,43BW,47BD,53HJ,53HW,54AL,54CT,56AL, 58AN,59KP,63C,63Ea,63EMK,64FR,65BC,65CG, 65SS,67WC,69B,70HW,70PM,70W,71AK,71Nc, 72B,73KB,73VK

Li^+ 64SH

Be^{2+} 61HG,65BG

Mg^{2+}-Ba^{2+} 23B,54CT,55P,68TW,69AL,69GS,70E, 71BH,71CV

Sc^{3+} 55P,59KP,69ALa

Y^{3+} 59KP,59Se,61PG,67WC,69AL,69ALa

La^{3+}-Lu^{3+} 55P,57KH,67WC,69AL,70AL

Ac^{3+} 70AL

Am^{3+},Cm^{3+} 69ALa

Th^{4+} 49DR,50DS,51ZA,69Na,70Bc,71KMF

Pa^{4+},Pa(V) 66Ga

U^{4+} 69GV,69Na

Np^{4+} 66AB

Pu^{4+} 49Mb,55P

UO_2^{2+} 54ALa,54DP,56AL,69GV,71AK

NpO_2^{2+} 68AB,70AWa

Mn^{2+} 65CG,72BHa

Fe^{2+},Co^{2+} 72BHa

Ni^{2+} 56AR,72BHa

Cu^{2+} 56AR,58CP,72BHa

Cr^{3+} 52WT,55P

Mn^{3+} 48T

Fe^{3+} 42BG,49DR,53HW,53Sc,55P,55Y,56CH, 59Se,61Y,67WC

VO^{2+} 58AN,71AK

Zr^{4+} 49CMa,55P,63AK,67Na,69N,72B

Hf^{4+} 67N

VO_2^+ 69IV

$Nb(OH)_2^{3+}$ 71Nc

Ag^+ 52LM,61CP

CH_3Hg^+ 65SS

Tl^+ 53BG

$(CH_3)_3Sn^+$,$(CH_3)_2Sn^{2+}$,CH_3Sn^{3+} 66CP

$(CH_3)_3Pb^+$,$(C_2H_5)_3Pb^+$,$(CH_3)_2Pb^{2+}$, $(C_2H_5)_2Pb^{2+}$,$(C_3H_7)_2Pb^{2+}$ 70PM

Zn^{2+} 56AR,58CP,63MHa,69G,71CD

Cd^{2+} 43L,66G

Hg^{2+} 55P

Sn^{2+} 61CP,70BT

Pb^{2+} 23B,61SR,64MH,65BC,71B,72H

B(III) 71GH

Al^{3+} 43BO,53LJ,55P,59KG,69B,71AM,71WT

Ga^{3+} 55Y,55P,71WT

In^{3+} 54HK,54Sa,55P,68AL,69R,71WT,74VK

Hydrogen fluroide (continued)

Sb^{3+} 70Ba

Bi^{3+} 69Ba

Ge(IV) 63BP

Other references: 12P,24DH,25RH,27A,31KP, 36RB,37J,37RP,39L,39R,41ID,46R,46Ra, 48RS,48W,49L,49TD,50K,50MKa,50TK,51Da, 51EU,51MS,51W,52JK,52K,52WT,53HJ,54BBa, 54Fa,54JK,54SD,54SE,55DW,55M,55RU,56Kg. 56TK,57Sd,57TV,58PL,59KGb,59Ta,59TL, 59WP,60CC,60Ka,60KG,60KV,60SB,60TV,61D, 61Kd,61MF,61TD,62Ba,62CM,62LN,62NL,62SE, 62VF,63MHa,63TN,63VH,63VR,64FC,64RK,64VH, 65DK,65HS,65SG,64SK,65VW,66BF,66LN,66N, 66PP,67Aa,67BN,67HR,67I,67KR,67LD,67LN, 67MF,67PM,67VK,67VS,68FH,68HSb,68IZ,68K, 68Ka,68KK,68KKa,68KKb,68PM,68SR,68V,69B, 69Bb,69DK,69KK,69KKP,69SG,69VSa,70B,70BH, 70BO,71B,71NL,71PMP,72B,72H,72LO,73J,73MSa, 74MG

Cl^-

Cl^- Chloride ion L^-

Metal ion	Equilibrium	Log K 25°, 0.5	Log K 25°, 1.0	Log K 25°, 0	ΔH 25°, 0	ΔS 25°, 0
K^+	ML/M.L			(-0.7)		
Rb^+	ML/M.L			(-0.55) ±0.2		
Cs^+	ML/M.L			(-0.39) ±0.1		
$(CH_3)_4N^+$	ML/M.L			(0.04)		
$(C_4H_9)_4N^+$	ML/M.L			(0.40)		
Be^{2+}	ML/M.L	-0.3[q]		(-0.8)[f]		
	$ML_2/M.L^2$			-0.7[f]		
Mg^{2+}	ML/M.L		-1.0[e]			
Ba^{2+}	ML/M.L			(-0.13)[n]		
Sc^{3+}	ML/M.L	0.04[q]		-0.12[f]		
	$ML_2/M.L^2$	-0.1[q]		-0.8[f]		
Y^{3+}	ML/M.L		-0.1			
La^{3+}	ML/M.L		-0.1 ±0.0	-0.2[f]	1.2	4[c]
	$ML_2/M.L^2$			-0.6[f]		
Ce^{3+}	ML/M.L		-0.1 ±0.0			
	$ML_2/M.L^2$		-0.5			
Pr^{3+}	ML/M.L		-0.1[j]			
Eu^{3+}	ML/M.L		-0.1 ±0.0	-0.15[f]	(0)[s]	(0)[c]
	$ML_2/M.L^2$		-0.7 ±0.2	-0.7[f]		
Tm^{3+}	ML/M.L		-0.1[j]			
Yb^{3+}	ML/M.L		-0.2[j]			
Lu^{3+}	ML/M.L		-0.4[j]	-0.35[f]		
	$ML_2/M.L^2$			-0.6[f]		
Ac^{3+}	ML/M.L		-0.1	-0.04[f]		
	$ML_2/M.L^2$		-0.6	(-1.0)[f]		
Pu^{3+}	ML/M.L		-0.1			

[c] 25°. 1.0; [e] 25°, 3.0; [f] 25°, 4.0; [j] 20°, 1.0; [q] 20°, 0.7; [n] 18°, 0; [s] 0-48°, 1.0

Chloride ion (continued)

Metal ion	Equilibrium	Log K 25°, 0.5	Log K 25°, 1.0	Log K 25°, 0	ΔH 25°, 0	ΔS 25°, 0
Am^{3+}	ML/M.L		-0.1[j] ±0.1	-0.15[f]		
	$ML_2/M.L^2$			-0.7[f]		
Bk^{3+}	ML/M.L		-0.02			
Es^{3+}	ML/M.L		-0.02			
Th^{4+}	ML/M.L	0.30 ±0.05	0.18	1.38		
		0.08[d]		0.17[f] ±0.06		
	$ML_2/M.L^2$	-1.0[d]		-0.9[f] ±0.0		
Pa^{4+}	$ML_2/M.L^2$		0.0[e]			
U^{4+}	ML/M.L	0.26[d]	0.30[j]		(-5)[t]	(-16)[d]
Np^{4+}	ML/M.L	0.15[i]	-0.04[j]			
		0.04[k]				
	$ML_2/M.L^2$	-0.15[k]	-0.24[j]			
	$ML_3/M.L^3$		-0.5[j]			
Pu^{4+}	ML/M.L		0.14	0.15[m]		
	$ML_2/M.L^2$		-0.17	0.08[m]		
	$ML_3/M.L^3$			-1.0[m]		
UO_2^{2+}	ML/M.L	-0.06[d]	-0.10[j]	0.21	(4)[t]	(13)[d]
NpO_2^{2+}	ML/M.L	-0.3	-0.09[u]			
	$ML_2/M.L^2$		-0.8[u]			
PuO_2^{2+}	ML/M.L	0.10[d] -0.01			(2)[t]	(7)[d]
	$ML_2/M.L^2$	-0.35[d] -0.07			(4)[t]	(12)[d]
Mn^{2+}	ML/M.L		0.04			
Co^{2+}	ML/M.L		-0.05			
		-0.14[d]	-0.26[e] ±0.02		0.5[d]	1[d]
Ni^{2+}	ML/M.L		0.00			
		-0.21[d] ±0.04	-0.57[e]		0.5[d]	1[d]
Cu^{2+}	ML/M.L	0.09[d]	-0.06[e]	0.40	1.6[d]	6[d]
	$M.(OH)^{1.5}.L^{0.5}/M(OH)_{1.5}L_{0.5}(s)$	-17.16		-17.3 ±0.1	(9)[r]	(-50)

[d] 25°, 2.0; [e] 25°, 3.0; [f] 25°, 4.0; [i] 20°, 0.5; [j] 20°, 1.0; [k] 20°, 2.0; [m] 20°, 4.0; [r] 25-75°, 0; [t] 10-40°, 2,0; [u] 10°, 3.0

Chloride ion (continued)

Metal ion	Equilibrium	Log K 25°, 0.5	Log K 25°, 1.0	Log K 25°, 0	ΔH 25°, 0	ΔS 25°, 0
Re^{2+}	ML/M.L	2.0				
Ti^{3+}	ML/M.L	0.34[v]				
Cr^{3+}	ML/M.L	-0.4[d]	-0.5	0.05[f]	6.6[g]	22[f]
Mn^{3+}	ML/M.L	0.9[d]	1.12[e]			
Fe^{3+}	ML/M.L	0.64	0.63 ±0.03	1.48 ±0.00	5.6	26
		0.7[d]	0.8[e]	1.0[f]	4.3[c]	17[c]
	$ML_2/M.L^2$		0.75 ±0.05	2.13		
	$ML_3/M.L^3$		-0.7			
Co^{3+}	ML/M.L		1.42[e]			
VO^{2+}	ML/M.L		0.04[j]			
Zr^{4+}	ML/M.L	0.30[d]		0.92[w]		
	$ML_2/M.L^2$			1.32[w]		
	$ML_3/M.L^3$			1.51[w]		
	$ML_4/M.L^4$			1.2[w]		
Hf^{4+}	ML/M.L	0.38[d]	0.34[l]			
	$ML_2/M.L^2$	0.07[d]	-0.02[l]			
	$ML_3/M.L^3$	-0.6[d]				
Cu^{+}	ML/M.L			2.70[g]		
	$ML_2/M.L^2$	5.19[h]		5.5[o]		
				6.00[g]		
	$ML_3/M.L^3$			5.7[o]		
				6.0[g]		
	$M_2L_4/M^2.L^4$			13.1[g]		
	M.L/ML(s)			-6.73		
				-7.38[g]		

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[c] 25°, 1.0; [d] 25°, 2.0; [e] 25°, 3.0; [f] 25°, 4.0; [g] 25°, 5.0; [h] 20°, 0.1; [j] 20°, 1.0; [l] 20°, 3.0 $HClO_4$; [o] 20°, 0; [v] 40°, 0.5; [w] 20°, 6.5 H^+

Chloride ion (continued)

Metal ion	Equilibrium	Log K 25°, 0.5	Log K 25°, 1.0	Log K 25°, 0	ΔH 25°, 0	ΔS 25°, 0
Ag^+	ML/M.L	3.08[a]	3.36	3.31 ±0.00		
			3.45[m]	3.70[g]		
	$ML_2/M.L^2$	5.08[a]	5.20	5.25 ±0.01		
			5.67[m]	5.62[g]		
	$ML_3/M.L^3$		6.0[m]	6.4[g]		
	$ML_4/M.L^4$		6.0[m]	6.1[g]		
	M.L/ML(s)	-9.62	-9.74	-9.74 ±0.00	15.7	8
			-10.05[e]	-10.40[m]		
Hg_2^{2+}	$M.L^2/ML_2(s)$	-16.88		-17.91 ±0.03	22[s] ±3	-8[b]
CH_3Hg^+	ML/M.L	5.18[a]	5.32		-6.0[h]	4[a]
Tl^+	ML/M.L	0.11 ±0.00	0.04 ±0.04	0.49 ±0.03	-1.5 ±0.1	-3
		-0.10[d] ±0.02	-0.1[e] ±0.1	0.0[f] ±0.1		
	$ML_2/M.L^2$		-0.1 ±0.3	0.0 ±0.2		
		-0.6[d] ±0.5	-1.0[e] ±0.1	-0.8[f] ±0.5		
	M.L/ML(s)			-3.74 ±0.02	(10)[r]	(15)
				-3.04[f]		
$(CH_3)_3Pb^+$	ML/M.L		0.32			
$(C_2H_5)_3Pb^+$	ML/M.L		0.57			
Pd^{2+}	ML/M.L		4.47 -0.5	6.1 -0.1	-3.0[c]	10[c]
	$ML_2/M.L^2$		7.74 -0.3	10.7 -0.1	-5.6[c]	17[c]
	$ML_3/M.L^3$		10.2 -0.4	13.1 ±0.0	-8.2[c]	19[c]
	$ML_4/M.L^4$		11.5 ±0.6	15.4 ±0.3	-11.6[c]	14[c]
Pt^{2+}	$ML_2/ML.L$	4.0				
	$ML_2(cis)/ML_2(trans)$	0.08				
	$ML_3/ML_2.L$	2.96				
	$ML_4/ML_3.L$	1.90			(-4)[s]	(-5)[b]

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[a] 25°, 0.1; [b] 25°, 0.5; [c] 25°, 1.0; [d] 25°, 2.0; [e] 25°, 3.0; [f] 25°, 4.0; [g] 25°, 5.0; [h] 20°, 0.1; [m] 20°, 4.0; [r] 0-50°, 0; [s] 7-40°, 0.5

Chloride ion (continued)

Metal ion	Equilibrium	Log K 25°, 0.5	Log K 25°, 1.0	Log K 25°, 0	ΔH 25°, 0	ΔS 25°, 0
Zn^{2+}	ML/M.L		0.11	0.43		
		-0.49[d]	-0.19[e]	0.30[f]	1.3[e]	4[e]
				0.61		
	$ML_2/M.L^2$	0.02[d]	-0.6[e]	0.0[f]	9[e]	27[e]
	$ML_3/M.L^3$			0.5		
		-0.1[d]	0.1[e]	1.0[f]	0[e]	1[e]
	$ML_4/M.L^4$			0.2		
				-1[f]		
	$M.(OH)^{1.5}.L^{0.5}/M(OH)_{1.5}L_{0.5}(s)$			-13.4		
Cd^{2+}	ML/M.L	1.35 ±0.02	1.35 ±0.02	1.98 ±0.03	0.3[b]	7[b]
		1.44[d]±0.02	1.54[e]±0.05	1.66[f]±0.1	-0.1[e]	7[e]
	$ML_2/M.L^2$	1.7 ±0.1	1.7 ±0.1	2.6 ±0.1	0.9[b]	11[b]
		1.9[d] ±0.1	2.2[e] ±0.1	2.4[f] ±0.1	0.0[e]	10[e]
	$ML_3/M.L^3$		1.5 ±0.2	2.4 ±0.1	2.4[c]	15[c]
		1.9[d] ±0.1	2.3[e] ±0.1	2.8[f] ±0.3	1.9[e]	17[e]
	$ML_4/M.L^4$			1.7		
			1.6[e]	2.2[f] +0.3	6.1[f]	31[f]
Hg^{2+}	ML/M.L	6.74 -0.1	6.72		-4.8	
			7.07[e]		-5.7[b] ±0.2	12[b]
					-5.8[e]	13[e]
	$ML_2/M.L^2$	13.22 -0.2	13.23		-12.8[b] ±0.0	18[b]
			13.98[e]		-12.3[e]	23[e]
	$ML_3/M.L^3$	14.1 ±0.2	14.2		-15.0[b]	14[b]
			14.7[e] ±0.0		-13.3[e]	23[e]
	$ML_4/M.L^4$	15.1 ±0.1	15.3		-14.9[b]	19[b]
			16.2[e] ±0.1		-14.8[e]	25[e]
	ML/MOHL.H		3.1			
	$MOHL.L/ML_2.OH$		4.23	4.09	-1.2	15
	$M(OH)_2.L/MOHL.OH$		3.8	3.77	-1.2	13

[b] 25°, 0.5; [c] 25°, 1.0; [d] 25°, 2.0; [e] 25°, 3.0; [f] 25°, 4.0

Chloride ion (continued)

Metal ion	Equilibrium	Log K 25°, 0.5	Log K 25°, 1.0	Log K 25°, 0	ΔH 25°, 0	ΔS 25°, 0
Sn^{2+}	ML/M.L			1.51		
		1.08[d]	1.17[e]±0.02	1.45[f]	(3)[x]	(15)[e]
	$ML_2/M.L^2$			2.25		
		1.72[d]	1.72[e]±0.02	2.35[f]	(3)[x]	(20)[e]
	$ML_3/M.L^3$			2.0		
		1.5[d]	1.7[e] ±0.0	2.5[f]	(6)[x]	(30)[e]
	$ML_4/M.L^4$			1.5		
				2.3[f]		
$(CH_3)_2Sn^{2+}$	ML/M.L		0.38[e]			
	$ML_2/M.L^2$		-0.1[e]			
Pb^{2+}	ML/M.L	0.9 -0.07	0.90 ±0.06	1.59 ±0.02	4.4	22
		1.02[d]±0.02	1.17[e]±0.03	1.29[f]±0.06		
	$ML_2/M.L^2$	1.3 -0.1	1.3 ±0.1	1.8		
		1.4[d] ±0.0	1.7[e] ±0.1	2.0[f] ±0.2		
	$ML_3/M.L^3$		1.4 ±0.2	1.7		
		1.5[d] ±0.1	1.9[e] ±0.1	2.3[f] ±0.2		
	$ML_4/M.L^4$			1.4		
		0.7[d] ±0.2	1.2[e] ±0.2	1.7[f] ±0.2		
	$M.L^2/ML_2(s)$		-5.0[e]	-4.78 ±0.02		
$(CH_3)_2Pb^{2+}$	ML/M.L		0.76			
	$ML_2/M.L^2$		1.31			
$(C_2H_5)_2Pb^{2+}$	ML/M.L		0.96			
	$ML_2/M.L^2$		1.74			
$(C_3H_7)_2Pb^{2+}$	ML/M.L		0.99			
	$ML_2/M.L^2$		1.84			
Au(III)	$M(OH)_3L/M(OH)_4.H.L$			8.51[o]		
	$M(OH)_2L_2/M(OH)_4.H^2.L^2$			16.57[o]		
	$MOHL_3/M(OH)_4.H^3.L^3$			23.6[o]		
	$ML_4/M(OH)_4.H^4.L^4$			29.6[o]		
Ga^{3+}	ML/M.L	0.01[q]				

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[d] 25°, 2.0; [e] 25°, 3.0; [f] 25°, 4.0; [o] 20°, 0; [q] 20°, 0.7; [x] 0-45°, 3.0

Chloride ion (continued)

Metal ion	Equilibrium	Log K 25°, 0.5	Log K 25°, 1.0	Log K 25°, 0	ΔH 25°, 0	ΔS 25°, 0
In^{3+}	ML/M.L	2.32[q]±0.05	2.20[j]			
		2.45[d]	2.58[e]		1.2[d]	15[d]
	$ML_2/M.L^2$	3.62[q]±0.05	3.56[j]			
		3.4[d]	3.84[e]		0.8[d]	18[d]
	$ML_3/M.L^3$	4.0[q] ±0.2				
		3.7[d]	4.2[e]		8[d]	44[d]
	MOHL/ML.OH		10.3[e]			
	$M_2OHL/MOHL.M$		1.6[e]			
Tl^{3+}	ML/M.L	6.72		7.72	-5.5[e]	14[e]
			7.10[e]±0.06	7.46[f]	-6.0[f]	14[f]
	$ML_2/M.L^2$	11.76 ±0.07		13.48	-9.9[e]	24[e]
			12.46[e]±0.1	13.25[f]	-10.1[f]	27[f]
	$ML_3/M.L^3$	14.4 ±0.0		16.5	-11.0[e]	35[e]
			15.8[e] ±0.3	16.7[f]	-11.2[f]	39[f]
	$ML_4/M.L^4$	16.3 ±0.1		18.3	-11.3[e]	45[e]
			18.0[e] ±0.3	19.4[f]	-11.3[f]	51[f]
	ML/MOHL.H		1.87[e]			
As(III)	$M(OH)_2L/M(OH)_3.H.L$			-1.07		
	$MOHL_2/M(OH)_3.H^2.L^2$			-4.54		
	$ML_3/M(OH)_3.H^3.L^3$			-8.7		
Sb^{3+}	ML/M.L			2.3[f]		
	$ML_2/M.L^2$			3.5[f]		
	$ML_3/M.L^3$			4.2[f]		
	$ML_4/M.L^4$			4.7[f]		
	$ML_5/M.L^5$			4.7[f]		
	$ML_6/M.L^6$			4.1[f]		

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[d] 25°, 2.0; [e] 25°, 3.0; [f] 25°, 4.0; [j] 20°, 1.0; [q] 20°, 0.7

Chloride ion (continued)

Metal ion	Equilibrium	Log K 25°, 0.5	Log K 25°, 1.0	Log K 25°, 0	ΔH 25°, 0	ΔS 25°, 0
Bi^{3+}	ML/M.L	(2.36)[k]	2.2[e]		4.0	
					0.5[f]	12[e]
	$ML_2/M.L^2$	3.5[k]	3.5[e]		(4)[x]	(30)[e]
	$ML_3/M.L^3$	5.4[k]	5.8[e]		(5)[x]	(40)[e]
	$ML_4/M.L^4$	6.1[k]	6.8[e]		(4)[x]	(50)[e]
	$ML_5/M.L^5$	6.7[k]	7.3[e]			
	$ML_6/M.L^6$	6.6[k]	7.4[e]			
	$MOL(s).H^2/M.L$		-6.47	-7.80	(1)[r]	(-30)
		-6.59[d]±0.05	-6.75[e]		(4)[t]	(-20)[d]

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[d] 25°, 2.0; [e] 25°, 3.0; [f] 25°, 4.0; [k] 20°, 2.0; [r] 15-25°, 0; [t] 15-25°, 2.0; [x] 25-65°, 3.0

Bibliography:

K^+ 71PJ

Rb^+ 12NF,66MB,72DJ

Cs^+ 12NF,27D,54GMa,71PJ

$(CH_3)_4N^+$,$(C_4H_9)_4N^+$ 68F

Be^{2+} 65MJ,71SK

Mg^{3+} 73HHa

Ba^{2+} 35MD

Sc^{3+} 64RSM,66SH

Y^{3+}-Lu^{3+} 51M,62PM,63CU,64La,65S,67SS,71KN

Ac^{3+} 68SMR,69SS

Pu^{3+} 53CM

Am^{3+} 62G,62PM,65S,71KN

Bk^{3+},Es^{3+} 72HP

Th^{4+} 50DS,51ZA,52WS

Pa^{4+},Pa(V) 66Ga

U^{4+} 54AL,55DW

Np^{4+} 66SN

Pu^{4+} 58RA,60GN

UO_2^{2+} 51Aa,54DP,57DM

NpO_2^{2+} 55CS,70AW

PuO_2^{2+} 57NB,61RMa

Mn^{2+} 74BL

Co^{2+} 60LR,66KL,67MS,70MM,74BL

Ni^{2+} 57KL,60LR,66KL,70MM,74BL

Cu^{2+} 49NT,51Ma,51NL,58BB,60BB,66KL, 68MM,69MM

Re^{2+} 65PY

Ti^{3+} 54DQ

Cr^{3+} 58SK,64BK,66AS,67HK

Mn^{3+} 48T,74RN

Fe^{3+} 39L,42RS,55LR,61SRD,61WK,62WG,63HC, 67VLb,69F,71MH

Co^{3+} 66CN

VO^+ 58AN

Zr^{4+} 49CMa,57S

Hf^{4+} 63PA,67HP

Cu^+ 38L,61H,68ST,70AR,70GZ

Ag^+ 38OB,52GM,52JMa,54GM,54KT,55DJ, 55Fb,57CH,57L,61K,64AJ,64WG,71AB

Hg_2^{2+} 29B,46L,47JQ,55DG,63HI

CH_3Hg^+ 65SS,73BI

Tl^+ 26BH,27D,27O,28RV,30BD,34CL,37RD, 53BG,55Aa,57N,57NN,58H,61KMF,61NR, 62Se,63KM,67Ka,67KPa,69BP,71BS, 71FR,72FI

$(C_6H_5)_3Sn^+$,$(C_6H_5)_3Pb^+$ 65SM

Chloride ion (continued)

$(CH_3)_3Pb^+$, $(C_2H_5)_3Pb^+$ 71PM

Pd^{2+} 57DBF,63GKG,64BS,64W,65FK,66SB,68L, 68LMV,72E,72R

Pt^{2+} 66EL,67DE,70Ea

Zn^{2+} 44SL,57KL,58AS,64MK,68SM,69G,71FCK,74BL

Cd^{2+} 30RD,36HF,41L,49K,53E,53VD,57KL,58TF, 59Ma,62BD,63MKN,65M,66G,66M,67MF,68GJ, 68P,69SP,71FCK,72FKM,73HH,74BL,74EM, 74FRP

Hg^{2+} 47LJ,57M,58E,60GK,61MP,63EM,63HI,64CI, 65A,65PI,66VS,68CG

Sn^{2+} 28P,50DC,52VR,61RM,61TH,62HZ

$(CH_3)_2Sn^{2+}$ 65FMT

Pb^{2+} 30RD,44NG,55BPP,55K,55Na,57KL,57PC, 61M,63MKc,64AP,64MK,64MKb,64SM,65MKF, 66VSe,70FS,71V,72RSL,73V

Au(III) 48B

Ga^{3+} 67MA

In^{3+} 54CI,54S,54Sb,54Sc,59BK,69R,72F,72Fa

Tl^{3+} 60B,63AG,64LR,64WG,64KMb,71BS

As(III) 57Ad

Sb^{3+} 59PD

Bi^{3+} 57AG,63KMa,67VL,68VG

Other references: 03S,04BE,10M,23B,23P, 26LD,30W,31F,31FL,32N,33HJ,33NS,34BH, 34CC,35BM,35DH,36R,37M,38G,38PS,39G, 42Ba,42GN,42Nc,43O,44O,45B,56Na,48C, 49B,49DJ,49GGa,49Hb,49Jb,49RP,50B, 50KN,50MD,50N,51MS,51NK,51RL,51SSW, 52La,53BGa,53BL,53CT,53G,53GT,53N, 53P,53Pa,53WS,54SE,55GE,55M,55RC, 55WW,56G,56P,56PV,55Tb,57KS,57SL, 57TS,58Da,58GK,58Jb,58MW,58SPS,58SW, 58ZB,59CN,59Kc,59Mb,59Mc,59MC,59TC, 60BT,60FSS,60GG,60GS,60L,60Ma,60TZ, 61BT,61Ha,61MA,61MS,61S,61SM,62AP, 62BS,62DC,62FSD,62FT,62M,62MR,62MS, 62MSa,62P,62PPL,62Sb,62ST,63FD,63GK, 63KB,63MF,63MMa,63ND,64Ba,64BMa,64BP, 64ID,64NU,64SAb,64SB,64SM,64VR,65AB, 65BW,65GS,64HA,65HE,64HP,65HS,65JL, 65MRS,65NPG,66CP,66DO,66F,66L,66MSY, 66SG,66SHa,66WD,67BP,67EME,67ES,67Ga, 67IW,67KR,67L,67NK,68CF,68EPa,68L, 68LM,68MH,68NK,68NM,69BM,69Ca,69CPK, 69J,69KS,69MA,69MNM,69MP,69NPS,69PB, 69SB,69SM,69ST,70AW,70DS,70HV,70KBM, 70PH,70RG,71BHa,71BN,71D,71DC,71KB, 71KM,71MKA,71MM,71PB,71PJ,71PS,72BA, 72BBM,72DJ,72J,73SB,72TS,73GS,73L, 73Pa,74AC,74BC,74FKa,74GW,74MS,74SP

ClO_3^-

O_3Cl^- Chlorate ion L^-

Metal ion	Equilibrium	Log K 25°, 0.5	Log K 25°, 1.0	Log K 25°, 0	ΔH 25°, 0	ΔS 25°, 0
Li^+	ML/M.L			(-1.2)		
Na^+	ML/M.L			(-0.49) ±0.1		
K^+	ML/M.L			(-0.15) +0.1		
Rb^+	ML/M.L			(-0.10)		
Ba^{2+}	ML/M.L			(0.7)		
Sc^3	ML/M.L		-0.02		(0)[r]	(0)[c]
La^{3+}	ML/M.L		-0.2			
Eu^{3+}	ML/M.L	0.02[a]			(-5)[s]	(-17)[a]
Tb^{3+}	ML/M.L	-0.05[a]			(-4)[s]	(-14)[a]
Th^{4+}	ML/M.L	0.26				
Cu^{2+}	$M.(OH)^{1.5}.L^{0.5}/M(OH)_{1.5}L_{0.5}(s)$		-15.69	-15.89		
Fe^{3+}	ML/M.L		-0.40			
Ag^+	ML/M.L			(0.22)		
Tl^+	ML/M.L			0.47		
Cd^{2+}	ML/M.L		-0.26	-0.30[e]		
Pb^{2+}	ML/M.L		-0.32			
	$ML_2/M.L^2$		-0.6			

[a] 25°, 0.1; [c] 25°, 1.0; [e] 25°, 3.0; [r] 15-30°, 1.0; [s] 2-40°, 0.1

Bibliography:

Li^+ 67ADT

Na^+-Rb^+ 31BR,66MB,72DD

Ba^{2+} 35MD

Sc^{3+} 72MH

La^{3+} 51M

Eu^{3+},Tb^{3+} 72RC

Th^{4+} 50DS

Cu^{2+} 63LL

Fe^{3+} 71MH

Ag^+ 48M

Tl^+ 30BD

Cd^{2+} 43L,56Kb

Pb^{2+} 56Kb

Other references: 65PY,73HH

ClO_4^-

O_4Cl^- Perchlorate ion L^-

Metal ion	Equilibrium	Log K 20°, 0.15	Log K 25°, 1.0	Log K 25°, 0	ΔH 25°, 0	ΔS 25°, 0
K^+	ML/M.L			(-0.01) ±0.00		
Rb^+	ML/M.L			(0.13)		
$(CH_3)_4N^+$	ML/M.L			0.27	0.2	2
$(C_2H_5)_4N^+$	ML/M.L			-0.08	0.0	0
$(C_3H_7)_4N^+$	ML/M.L			0.05	2.5	9
Ce^{3+}	ML/M.L		0.15[s]	-0.21[t]	(-17)[u]	(-60)[s]
Am^{3+}	ML/M.L	-0.07[d]				
Cu^{2+}	$M.(OH)^{1.7}.L^{0.3}/M(OH)_{1.7}L_{0.3}(s)$			-17.2		
Fe^{3+}	ML/M.L	0.4 ±0.1		1.15		
Tl^+	ML/M.L			0.0 ±0.2	(2)[v]	(7)

[d] 25°, 2.0; [s] 25°, 1.1; [t] 25°, 5.1; [u] 18-40°, 1.1; [v] 23-80°, 0

Bibliography:

K^+ 45J,71Da

Rb^+ 71Da

$(CH_3)_4N^+$, $(C_2H_5)_4N^+$, $(C_3H_7)_4N^+$ 69IE

Ce^{3+} 56SW

Am^{3+} 72BC

Cu^{2+} 49NT

Fe^{3+} 54Se,58Ha,59Sa,60RS,69F

Tl^+ 37RD,66MB,67ZB

Other references: 48M,52Se,54HR,55HB, 60HR,61H,63FP,63Hc,64S,65HD,65JB, 66LV,66R,68D,68OA,70KS,73J,74J

Br^-

Br^- Bromide ion L^-

Metal ion	Equilibrium	Log K 25°, 0.5	Log K 25°, 1.0	Log K 25°, 0	ΔH 25°, 0	ΔS 25°, 0
Cs^+	ML/M.L			(0.03)		
$(CH_3)_4N^+$	ML/M.L			(0.16) ±0.07		
$(C_2H_5)_4N^+$	ML/M.L			(0.38)		
$(C_3H_7)_4N^+$	ML/M.L			(0.49)		
Be^{2+}	ML/M.L	-0.4[q]		-0.7[f]		
	$ML_2/M.L^2$			-0.8[f]		
Mg^{2+}	ML/M.L		-1.4[e]			
Sc^{3+}	ML/M.L	-0.07[q]				
	$ML_2/M.L^2$	-0.3[q]				
Y^{3+}	ML/M.L		-0.15			
Ce^{3+}	ML/M.L		-0.2			
Pr^{3+}	ML/M.L		-0.2[e]			
Sm^{3+}	ML/M.L		-0.2[e]			
Eu^{3+}	ML/M.L		-0.2			
	$ML_2/M.L^2$		-0.4			
Ho^{3+}	ML/M.L		(-0.6)[e]			
Er^{3+}	ML/M.L		-0.5[e]			
Ac^{3+}	ML/M.L		-0.2			
	$ML_2/M.L^2$		-0.5			
U^{4+}	ML/M.L		0.18[j]			
UO_2^{2+}	ML/M.L		-0.3[j]	-0.2		
Co^{2+}	ML/M.L	-0.13[q]				
		(-0.11)[d]	-0.7[e]		0.1[d]	0[d]
	$ML_2/M.L^2$	-0.4[q]				
Ni^{2+}	ML/M.L	(-0.12)[d]	-0.8[e]		0.1[d]	0[d]
Cu^{2+}	ML/M.L	-0.07[d]	-0.5[e] ±0.1	-0.03	0.9[d]	3[d]
	$M.(OH)^{1.5}.L^{0.5}/M(OH)_{1.5}L_{0.5}(s)$		-16.70	-17.15[o]		

[d] 25°, 2.0; [e] 25°, 3.0; [f] 25°, 4.0; [j] 20°, 1.0; [o] 20°, 0; [q] 20°, 0.7

Bromide ion (continued)

Metal ion	Equilibrium	Log K 25°, 0.5	Log K 25°, 1.0	Log K 25°, 0	ΔH 25°, 0	ΔS 25°, 0
Fe^{3+}	ML/M.L		-0.2 ±0.1	0.6 ±0.0	(6)[r]	(20)
	$ML_2/M.L^2$		-0.5 ±0.1			
Hf^{4+}	ML/M.L		-0.1[l]			
Cu^{+}	$ML_2/M.L^2$			5.9		
	M.L/ML(s)			-8.3		
Ag^{+}	ML/M.L	4.30[a]		4.68[n]		
	$ML_2/M.L^2$	6.64[a]	7.23[g]	(7.7)[n]		
	$ML_3/M.L^3$	8.1[a]	8.3	8.7 ±0.2		
			9.2[g]			
	$ML_4/M.L^4$	8.9[a]	9.5[g]	9.0		
	M.L/ML(s)	-12.10[a]	-11.92	-12.30 ±0.02	20.2	11
			-12.62[g]			
Hg_2^{2+}	$M.L^2/ML_2(s)$	-21.29		-22.25 ±0.01	31[s] ±1	2[b]
CH_3Hg^{+}	ML/M.L	6.49[a]			-9.9[h]	-4[a]
Tl^{+}	ML/M.L	0.48	0.41	0.91 ±0.03	-3.0 ±0.5	-6
		0.38[d]	0.34[e]	0.33[f] ±0.01	-5[f]	-15[f]
	$ML_2/M.L^2$			0.17[f] ±0.04		
	$ML_3/M.L^3$			-0.1[f] ±0.2		
	$ML_4/M.L^4$			-0.6[f]		
	M.L/ML(s)			-5.44 ±0.03	(14)[t]	(22)
				-4.81[f] -0.01		
$(C_6H_5)_3Sn^{+}$	ML/M.L	3.3[p]				
$(C_6H_5)_3Pb^{+}$	ML/M.L	5.7[p]				
Pd^{2+}	ML/M.L		5.17		-5.1[c]	7[c]
	$ML_2/M.L^2$		9.42			
	$ML_3/M.L^3$		12.7			
	$ML_4/M.L^4$		14.9 ±1		-13.1[a]	24[c]
Zn^{2+}	ML/M.L		-0.59[e] ±0.02		0.4[e]	-1[e]

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[a] 25°, 0.1; [b] 25°, 0.5; [c] 25°, 1.0; [d] 25°, 2.0; [e] 25°, 3.0; [f] 25°, 4.0; [g] 25°, 5.0; [h] 20°, 0.1; [l] 20°, 3.0; [n] 18°, 0; [p] 30°, 0.1; [r] 30-40°, 0; [s] 7-40°, 0.5; [t] 5-45°, 0

Bromide ion (continued)

Metal ion	Equilibrium	Log K 25°, 0.5	Log K 25°, 1.0	Log K 25°, 0	ΔH 25°, 0	ΔS 25°, 0
Cd^{2+}	ML/M.L	1.55 ±0.05	1.57 ±0.01	2.14 ±0.02	-0.8[b]	5[b]
		1.63[d]±0.05	1.74[e]±0.09		-1.0[e] ±0.0	5[e]
	$ML_2/M.L^2$		2.1 ±0.1	3.0 ±0.1	-0.8[b]	7[b]
		2.2[d] ±0.1	2.4[e] ±0.1		-1.6[e] -1	6[e]
	$ML_3/M.L^3$		2.6 ±0.1	3.0 ±0.1	0.0[b]	12[b]
		2.8[d] ±0.2	3.3[e] ±0.2		0.2[e] -1	16[e]
	$ML_4/M.L^4$		2.6 ±0.2	2.9 ±0.2		
		3.2[d] ±0.2	3.8[e] ±0.2		0.5[e] -1	19[e]
Hg^{2+}	ML/M.L	9.00 ±0.06	9.40[e]		-10.6	
					-10.2[b]+0.1	7[b]
					-9.6[e]	11[e]
	$ML_2/M.L^2$	17.1 ±0.2	17.98[e]		-20.9	
					-21.0[b] ±0.2	8[b]
					-19.2[e]	18[e]
	$ML_3/M.L^3$	19.4 ±0.2	20.7[e]		-23.8[b]	9[b]
					-21.8[e]	22[e]
	$ML_4/M.L^4$	21.0 ±0.2	22.23[e]		-25.9	
					-27.8[b] ±0.1	3[b]
					-25.2[e]	17[e]
	$M.L^2/ML_2(s)$	-18.9			25	-3[b]
Sn^{2+}	ML/M.L		0.74	1.16 ±0.05		
		0.50[d] ±0.07	0.75[e]±0.03	0.88[f]±0.03	(1)[u]	(7)[e]
	$ML_2/M.L^2$		0.9	1.7 ±0.1		
		(1.19)[d]	1.15[e]±0.02	1.43[f]	(3)[u]	(20)[e]
	$ML_3/M.L^3$		1.2[e] ±0.1	1.5[f]	(2)[u]	(20)[e]
	$ML_4/M.L^4$		0.4[e]	1.0[f]		
$(CH_3)_2Sn^{2+}$	ML/M.L		-1.0[e]			

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[b] 25°, 0.5; [d] 25°, 2.0; [e] 25°, 3.0; [f] 25°, 4.0; [u] 0-45°, 3.0

Bromide ion (continued)

Metal ion	Equilibrium	Log K 25°, 0.5	Log K 25°, 1.0	Log K 25°, 0	ΔH 25°, 0	ΔS 25°, 0
Pb^{2+}	ML/M.L	1.06	1.10 ±0.06	1.77 ±0.1		
		1.20[d]	1.29[e]±0.01	1.48[f]±0.03	(-1)[v]	(3)[e]
	$ML_2/M.L^2$	1.8	1.8	2.6		
		2.0[d]	2.2[e] +0.1	2.5[f]	(-1)[v]	(7)[e]
	$ML_3/M.L^3$	2.0	2.2 ±0.0	3.0		
		2.5[d] ±0.1	2.9[e] ±0.1	3.5[f]	(-1)[v]	(10)[e]
	$ML_4/M.L^4$		2.0	2.3		
		2.6[d]	3.1[e]	3.5[f]	(-4)[v]	(1)[e]
	$ML_5/M.L^5$	1.6[d]	2.4[e]	2.7[f]		
	$M.L^2/ML_2(s)$			-5.68[f]		
Ga^{3+}	ML/M.L	-0.10[q]				
In^{3+}	ML/M.L	2.04[q]	1.93			
		1.99[d]		2.08[f]	0.5[d]	11[d]
	$ML_2/M.L^2$	3.1[q]	2.6			
		2.6[d]		3.4[f]	1.4[d]	17[d]
	$ML_3/M.L^3$	3.4[q]		4.0[f]		
	$ML_4/M.L^4$			4.8[f]		
Tl^{3+}	ML/M.L	8.3[i]	8.9	9.7[n]		
			9.28[e]	9.51[f]	-9.0[f]	13[f]
	$ML_2/M.L^2$	14.6[i]	16.4	16.6[n]		
			16.70[e]	16.88[f]	-15.1[f]	27[f]
	$ML_3/M.L^3$	19.2[i]		21.2[n]		
			22.1[e]	22.3[f]	-19.6[f]	36[f]
	$ML_4/M.L^4$	22.3[i]		23.9[n]		
			25.7[e]	26.4[f]	-21.8[f]	48[f]

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[d] 25°, 2.0; [e] 25°, 3.0; [f] 25°, 4.0; [i] 20°, 0.4; [n] 18°, 0; [q] 20°, 0.7; [v] 5-65°, 3.0

Bromide ion (continued)

Metal ion	Equilibrium	Log K 25°, 0.5	Log K 25°, 1.0	Log K 25°, 0	ΔH 25°, 0	ΔS 25°, 0
Bi^{3+}	ML/M.L	2.37	2.22	3.06 +0.2	3.3	25
		2.32[d] ±0.04	2.63[e]	3.12[f]	0.0[f]	14[f]
					0.7[w]	
	$ML_2/M.L^2$	4.2	(4.4)	5.6		
		4.4[d] ±0.1	5.0[e]	5.7[f]		
	$ML_3/M.L^3$	5.9	6.2	7.4		
		6.3[d] ±0.1	6.7[e]	8.2[f]		
	$ML_4/M.L^4$	7.3	(7.2)	8.6		
		7.8[d] ±0.1	8.1[e]	10.0[f]		
	$ML_5/M.L^5$	8.2	8.7	(9.2)		
		9.2[d] ±0.1	(9.0)[e]	11.9[f]		
	$ML_6/M.L^6$	8.3	8.8	(8.7)		
		9.5[d] ±0.2	9.8[e]	11.8[f]		
	$M.L/H^2.MOL(s)$	-6.24[d]				
		-6.52[k]				

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[d] 25°, 2.0; [e] 25°, 3.0; [f] 25°, 4.0; [k] 20°, 2.0; [w] 50°, 4.0

Bibliography:

Cs^+ 68HF

$(CH_3)_4N^+, (C_2H_5)_4N^+, (C_3H_7)_4N^+$ 65Lb,67Wa

Be^{2+} 65MJ,71SK

Mg^{2+} 73HHa

Sc^{3+} 64MR

Y^{3+}, Ce^{3+}, Eu^{3+} 63CU

$Pr^{3+}, Sm^{3+}, Er^{3+}$ 73KP

Ho^{3+} 66MSY,73KP

Ac^{3+} 68SMR

U^{4+} 54AL

UO_2^{2+} 51Aa,57DM

Co^{2+} 61LW,65FM,66KL

Ni^{2+} 61LW,66KL

Cu^{2+} 50Na,51NL,60LR,66KL,68MM,70MM

Fe^{3+} 39L,42RS,55LR,57YT,67M,71MH

Hf^{4+} 67HP

Cu^+ 38L

Ag^+ 38OB,53BLa,53GM,54GM,54KT,54LP,54PV, 57L,67BP

Hg_2^{2+} 29B,48BJ,63HI

CH_3Hg^+ 65SS

Tl^+ 23B,33IT,55Aa,56Ca,57N,57NN,58Ma, 60KMa,62SD,69CP,74FRI

$(C_6H_5)_3Sn^+, (C_6H_5)_3Pb^+$ 65SM

Pd^{2+} 63GKG,64SB,64FK,66BSA,66SB,67IW, 72E,72R

Zn^{2+} 44SL,69G

Cd^{2+} 39B,41L,53E,53F,57KE,62BD,65HS,66G, 67SG,73HH,74EM,74FK

Hg^{2+} 39G,49BJ,57M,58E,58ST,60GK,61MP, 63BS,64CI,65A

Sn^{2+} 28P,51DP,52V,62Ha,69FB

$(CH_3)_2Sn^{2+}$ 65FMT

Bromide ion (continued)

Pb^{2+} 55BPR,55PP,56K,61KMT,63MKb,68FS,70FS, 72FSL,73HH

Ga^{3+} 67MA

In^{3+} 54CI,54S,54Sc,57BH,69R

Tl^{3+} 49B,56PV,60BT,63AG,64LR,67YK

Bi^{3+} 53BGa,57AG,65JL,67LD,67VL,71FKS

Other references: 03S,31FL,51MS,52Fa,53G, 54CV,54SE,54W,55M,55Na,56C,56SL, 57SL,58Da,60EK,60FSS,60GS,61Ha,61Mc, 61SM,62FSD,62P,63EM,63ND,64MKa,64PB, 64SLI,65MRI,65SMa,66DO,66LB,67KP,67MF, 67NP,67TG,68KTa,68SRR,69MA,69MM,69SGM, 70DS,70Eb,71BHa,71D,71EG,71KSa,71MO, 71PJ,71TS,72BH,72CP,72V,72Va,73GS,73SP, 73V

BrO_3^-

O_3Br^- Bromate ion L^-

Metal ion	Equilibrium	Log K 25°, 0.5	Log K 25°, 1.0	Log K 25°, 0	ΔH 25°, 0	ΔS 25°, 0
Li^+	ML/M.L	-0.77[r]	-0.82[s]	-0.5		
Na^+	ML/M.L			(-0.4) ±0.1		
K^+	ML/M.L			(-0.3)[o]		
Ba^{2+}	ML/M.L			(0.86)[o]		
	$M.L^2/ML_2(H_2O)(s)$	-5.11				
Sc^{3+}	ML/M.L		0.65		(-8)[t]	(-24)[c]
	$ML_2/M.L^2$		0.75			
Eu^{3+}	ML/M.L	0.58[a]			(-3)[v]	(-8)[a]
Tb^{3+}	ML/M.L	0.49[a]			(-4)[v]	(-11)[a]
Th^{4+}	ML/M.L	0.81				
	$ML_2/M.L^2$	0.91				
Cu^{2+}	$M.(OH)^{1.5}.L^{0.5}/M(OH)_{1.5}L_{0.5}(s)$	-16.13		-16.53		
Fe^{3+}	ML/M.L		0.36		(4)[t]	(15)[c]
Ag^+	M.L/ML(s)			-4.26 ±0.02	19.3	45
Tl^+	ML/M.L			0.3[u]		
	M.L/ML(s)			-3.78[u]-0.07	12	23
Cd^{2+}	ML/M.L		0.06[e]			
Pb^{2+}	ML/M.L			1.85		
	$M.L^2/ML_2(s)$			-5.10		

[a] 25°, 0.1; [c] 25°, 1.0; [e] 25°, 3.0; [o] 18°, 0; [r] 25°, 0.15; [s] 25°, 0.20; [t] 15-35, 1.0; [u] 30°, 0; [v] 2-40°, 0.1

Bibliography:

Li^+ 63RSa
Na^+ 31BR,57FK
K^+ Ba^{2+} 31BR
Sc^{3+} 72MH
Eu^{3+},Tb^{3+} 72RC
Cu^{2+} 63LLa
Th^{4+} 50DS
Fe^{3+} 71MH
Ag^+ 23B,49TL,51Mb,63RD,67SV
Tl^+ 23B,68K,69KM
Cd^{2+} 43L
Pb^{2+} 36MH

Other references: 03B,48M,74GF

I^-

I^- Iodide ion L^-

Metal ion	Equilibrium	Log K 25°, 0.5	Log K 25°, 1.0	Log K 25°, 0	ΔH 25°, 0	ΔS 25°, 0
K^+	ML/M.L			(-0.19)	(1)[r]	(2)
Rb^+	ML/M.L			(0.04)		
Cs^+	ML/M.L			(-0.03)		
$(CH_3)_4N^+$	ML/M.L			(0.31)		
$(C_2H_5)_4N^+$	ML/M.L			(0.46)		
$(C_3H_7)_4N^+$	ML/M.L			(0.66)		
$(C_4H_9)_4N^+$	ML/M.L			(0.78)		
Eu^{3+}	ML/M.L		-0.4			
Hf^{4+}	ML/M.L		-0.5[1]			
Cu^+	$ML_2/M.L^2$			8.9		
	$ML_3/M.L^3$			9.4[g]		
	$ML_4/M.L^4$			9.7[g]		
	M.L/ML(s)			-12.0		
Ag^+	ML/M.L		(8.1)[f]	6.58[n]		
	$ML_2/M.L^2$		11.0[f]	(11.7)[n]		
	$ML_3/M.L^3$			(13.1)[n]	-29	(-37)[n]
		13.6[d]	13.8[f]	14.1[t]		
	$ML_4/M.L^4$	14.2[d]	14.3[f]	14.4[t]		
	$M_2L_6/M^2.L^6$		29.7[f]			
	$M_3L_8/M^3.L^8$		46.4[f]			
	M.L/ML(s)		-16.35[f]	-16.08	26.5	15
Hg_2^{2+}	$M.L^2/ML_2(s)$	-27.47		-28.33 ±0.02	39[s] ±4	5[b]
CH_3Hg^+	ML/M.L	8.60[h]				
	$ML_2/M.L^2$	8.86[h]				
	M.L/ML(s)	-11.46[h]				

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[b] 25°, 0.5; [d] 25°, 2.0; [f] 25°, 4.0; [g] 25°, 5.0; [h] 20°, 0.1; [l] 20°, 3.0; [n] 18°, 0; [r] 5-55°, 0; [s] 7-40°, 0.5; [t] 25°, 7.0

Iodide ion (continued)

Metal ion	Equilibrium	Log K 25°, 0.5	Log K 25°, 1.0	Log K 25°, 0	ΔH 25°, 0	ΔS 25°, 0
$C_2H_5Hg^+$	$ML_2/ML.L$		-0.67			
	$ML_3/ML_2.L$		0.75			
	M.L/ML(s)		-4.11			
Tl^+	ML/M.L		0.74[f] ±0.02			
	$ML_2/M.L^2$		0.90[f] ±0.00			
	$ML_3/M.L^3$		1.06[f] ±0.02			
	M.L/ML(s)		-6.73[f]	-7.23 ±0.04	18[r]	27
$(C_6H_5)_3Sn^+$	ML/M.L	3.7[p]				
$(C_6H_5)_3Pb^+$	ML/M.L	7.3[p]				
Pd^{2+}	$ML_4/M.L^4$		24.5 ±0.5			
Zn^{2+}	ML/M.L		-1.5[e]			
Cd^{2+}	ML/M.L	1.86 ±0.04	1.89 ±0.02	2.28 ±0.1	-2.3 -0.1	3
		1.99[d] ±0.02	2.13[e] ±0.07		-2.5[c] ±0.0	0[c]
					-2.2[e] ±0.1	2[e]
	$ML_2/M.L^2$	3.2 ±0.1	3.2 ±0.1	3.92 ±0.1	-3.0[c]	5[c]
		3.4[d] ±0.1	3.6[e] ±0.1		-2.5[e]	8[e]
	$ML_3/M.L^3$	4.4 ±0.1	4.5 ±0.1	5.0 ±0.1	-4.4[c]	6[c]
		4.8[d] ±0.1	5.1[e] ±0.1		-3.2[e]	13[e]
	$ML_4/M.L^4$	5.5 ±0.1	5.6 ±0.1	6.0 ±0.1	-8.4[c]	-3[c]
		6.1[d] ±0.1	6.6[e] ±0.1		-7.0[e]	7[e]
Hg^{2+}	ML/M.L	12.87			-17.1 ±0.5	
					-18.0[b]	-2[b]
	$ML_2/M.L^2$	23.82			-34.2[b]	-6[b]
	$ML_3/M.L^3$	27.6 -0.1				
	$ML_4/M.L^4$	29.8 ±0.1			-43.3 ±0.3	
					-44.3[b]	-12[b]
	ML/MOHL.H	4.0				
	$M.L^2/ML_2$(s)	-27.95			41.1[b]	10[b]

[b] 25°, 0.5; [c] 25°, 1.0; [d] 25°, 2.0; [e] 25°, 3.0; [f] 25°, 4.0; [p] 30°, 0.1; [r] 10-26°, 0

Iodide ion (continued)

Metal ion	Equilibrium	Log K 25°, 0.5	Log K 25°, 1.0	Log K 25°, 0	ΔH 25°, 0	ΔS 25°, 0
Sn^{2+}	$ML/M.L$		0.70[f]			
	$ML_2/M.L^2$		1.13[f]			
	$ML_3/M.L^3$		2.1[f]			
	$ML_4/M.L^4$		2.3[f]			
	$ML_6/M.L^6$		2.6[f]			
	$ML_8/M.L^8$		2.1[f]			
	$M.L^2/ML_2(s)$		-5.08[f]			
Pb^{2+}	$ML/M.L$	1.30[d]	1.26	1.92 ±0.1		
			1.69[e]			
	$ML_2/M.L^2$	2.4[d]	2.8	3.2		
	$ML_3/M.L^3$	3.1[d]	3.4	3.9		
	$ML_4/M.L^4$	4.4[d]	3.9	4.5		
			5.3[g]			
	$M.L^2/ML_2(s)$	-7.61[d]		-8.10 ±0.09	(15)[r]	(10)
Ga^{3+}	$ML/M.L$	-0.2[q]				
In^{3+}	$ML/M.L$	1.64[q]				
		0.99[d]			-0.7[d]	2[d]
	$ML_2/M.L^2$	2.56[q]				
		2.26[d]			0.8[d]	14[d]
Tl^{3+}	$ML_4/M.L^4$		35.7[f]			
Bi^{3+}	$ML/M.L$	3.63				
	$ML_4/M.L^4$	15.0[k]				
	$ML_5/M.L^5$	16.8[k]				
	$ML_6/M.L^6$	18.8[k]				
	$M.L^3/ML_3(s)$	-18.09[k]				

[d] 25°, 2.0; [e] 25°, 3.0; [f] 25°, 4.0; [g] 25°, 5.0; [k] 20°, 2.0; [q] 20°, 0.7; [r] 0-60°, 0

Iodide ion (continued)

Bibliography:

K^+ 68AT

Rb^+ 64FF

Cs^+ 68HF

$(CH_3)_4N^+$, $(C_2H_5)_4N^+$, $(C_3H_7)_4N^+$, $(C_4H_9)_4N^+$ 68F

Eu^{3+} 63CU

Hf^{4+} 67HP

Cu^+ 59FS

Ag^+ 38OB,54KT,54W,56La,56LP,57L,62FSV

Hg_2^{2+} 29B,38L,49QS,63HI

CH_3Hg^+ 63Sb,65SS

$C_2H_5Hg^+$ 65BB

Tl^+ 21JS,23B,37DR,57N,60KMa

$(C_6H_5)_3Sn^+$, $(C_6H_5)_3Pb^+$ 65SM

Pd^{2+} 63GKG,65FK

Zn^{2+} 69G

Cd^{2+} 38BV,41L,56QP,60AM,64VG,66G,67SG,67VM, 68G,68GJ,69FD,69VP,70DS,74EM,74FK

Hg^{2+} 39G,49QS,52YA,54W,57M,57MV,58E, 60GK,61MP,63EM,63HI,64CI,73Aa

Sn^{2+} 68HJ

Pb^{2+} 31F,44N,45N,55BPR,55PP,56KE,60FSS, 60HT,60NM,61T,70FS

Ga^{3+} 67MA

In^{3+} 54CI,54S,69R

Tl^{3+} 66J

Bi^{3+} 57AG,57FH

Other references: 03S,23B,31FL,33HJ,36HB, 49SBa,51MS,53G,54CV,54SE,54YS,55M, 56SL,57KM,57TS,60CL,60GG,60L,60TM, 64BL,64EH,65HS,65NP,65SL,67BP,67CP, 67EH,67LD,67MF,67MFR,67PI,68GY, 69EP,71BHa,71K,71PJ,72FKS,72FSa, 72FSb

HO_3I Hydrogen iodate (iodic acid) HL

Metal ion	Equilibrium	Log K 25°, 0.5	Log K 25°, 1.0	Log K 25°, 0	ΔH 25°, 0	ΔS 25°, 0
H^+	HL/H.L			0.77 ±0.03	2.4	12
Na^+	ML/M.L			(-0.48)		
K^+	ML/M.L			(-0.26)±0.04		
Mg^{2+}	ML/M.L			0.72 ±0.00		
Ca^{2+}	ML/M.L			0.89		
	$M.L^2/ML_2(s)$	-5.07	-4.89	-6.15 ±0.02	21	43
		-4.70[d]	-4.84[e]	-5.06[f]		
Sr^{2+}	ML/M.L			1.00		
	$M.L^2/ML_2(s)$	-5.40	-5.29	-6.48		
		-5.29[d]	-5.30[e]	-5.37[f]		
Ba^{2+}	ML/M.L			1.10		
	$M.L^2/ML_2(s)$	-7.76	-7.60	-8.81 ±0.01		
		-7.43[d]	-7.35[e]	-7.39[f]		
Y^{3+}	$M.L^3/ML_3(s)$			-10.15 +0.2	2.2[r]	-39
La^{3+}	$M.L^3/ML_3(s)$			-10.99 +0.07	6.9[r]	-27
Ce^{3+}	ML/M.L	1.22[a]		1.90		
	$M.L^3/ML_3(s)$			-10.86	6.8[r]	-27
Pr^{3+}	ML/M.L	1.18[a]				
	$M.L^3/ML_3(s)$			-10.89 +0.2	6.7[r]	-27
Nd^{3+}	$M.L^3/ML_3(s)$			-11.02 +0.1	6.4[r]	-29
Pm^{3+}	ML/M.L	1.12[a]		1.81		
Sm^{3+}	$M.L^3/ML_3(s)$			-11.30 +0.1	5.8[r]	-32
Eu^{3+}	ML/M.L	1.15[a]-0.2		1.83	(3)[s]	(16)[a]
	$M.L^3/ML_3(s)$			-11.41 +0.1	5.1[r]	-35
Gd^{3+}	$M.L^3/ML_3(s)$			-11.37 +0.2	4.2[r]	-38

[a] 25°, 0.1; [d] 25°, 2.0; [e] 25°, 3.0; [f] 25°, 4.0; [r] 25°, 0.2; [s] 0-40°, 0.1

Hydrogen iodate (continued)

Metal ion	Equilibrium	Log K 25°, 0.5	Log K 25°, 1.0	Log K 25°, 0	ΔH 25°, 0	ΔS 25°, 0
Tb^{3+}	ML/M.L	1.20[a]-0.3				
	$M.L^3/ML_3(s)$			-11.19 +0.08	4.1[r]	-38
Dy^{3+}	$M.L^3/ML_3(s)$			-11.04 +0.1	3.6[r]	-39
Ho^{3+}	$M.L^3/ML_3(s)$			-10.87 +0.2	3.2[r]	-39
Er^{3+}	ML/M.L	1.26[a]		1.96		
	$M.L^3/ML_3(s)$			-10.71 +0.3	3.1[r]	-39
Tm^{3+}	ML/M.L	1.33[a]		2.02		
	$M.L^3/ML_3(s)$			-10.55 +0.2	2.6[r]	-40
Yb^{3+}	ML/M.L	1.18[a]		1.88		
	$M.L^3/ML_3(s)$			-10.40 +0.2	2.3[r]	-40
Lu^{3+}	$M.L^3/ML_3(s)$			-10.25	2.0[r]	-40
Th^{4+}	ML/M.L	2.88				
	$ML_2/M.L^2$	4.80				
	$ML_3/M.L^3$	(7.17)				
	$M.L^4/ML_4(s)$	-14.62				
UO_2^{2+}	$ML_2/M.L^2$	2.73[r]				
	$ML_3/M.L^3$	3.67[r]				
	$M.L^2/ML_2(s)$	-7.01[r]				
Cu^{2+}	$M.L^2/ML_2(s)$			-7.13 ±0.01	6.8	-10
	$M.(OH)^{1.5}.L^{0.5}/M(OH)_{1.5}L_{0.5}(s)$			-17.56		
Cr^{3+}	$ML_2/M.L^2$	2.11				
	$M.L^3/ML_3(s)$	-5.3				
Ag^+	ML/M.L		0.19	0.63	5.1	20
	$ML_2/M.L^2$			1.90	-5.2	-9
	M.L/ML(s)		-7.08	-7.51 ±0.01	12	-6
Hg_2^{2+}	$M.L^2/ML_2(s)$			-17.89		
Tl^+	ML/M.L		0.15			
	M.L/ML(s)			-5.51 ±0.00	13	19
Zn^{2+}	$M.L^2/ML_2(s)$			-5.41		

[a] 25°, 0.1; [r] 25°, 0.2

Hydrogen iodate (continued)

Metal ion	Equilibrium	Log K 25°, 0.5	Log K 25°, 1.0	Log K 25°, 0	ΔH 25°, 0	ΔS 25°, 0
Cd^{2+}	ML/M.L		0.51			
	$ML_2/M.L^2$		1.52			
	$M.L^2/ML_2$(s)			-7.64		
Pb^{2+}	$M.L^2/ML_2$(s)	-11.48[t]		-12.61		

[t] 35°, 0.3

Bibliography:

H^+ 27O,34AR,34K,39NR,41LLa,44HB,67PP
Na^+ 31BR
K^+ 31BR,48M,59S
Mg^{2+} 30D,38WD
Ca^{2+} 34K,38WD,49DW,53BG,74FRa
Sr^{2+} 52CM,74FRa
Ba^{2+} 35MD,38D,39NR,43DV,49DW,74FRa
Y^{3+}-Yb^{3+} 63LM,66FP,69BC,72RC,73CB
Th^{4+} 50DS,61SF
UO_2^{2+} 59KSN
Cu^{2+} 48K,51LW,51Ma,62LL,63RB
Cr^{3+} 69MH
Ag^+ 23B,38KL,41DS,41LL,51Mb,56RM,
Hg_2^{2+} 29B
Tl^+ 29LG,53BG,72BH
Zn^{2+} 50S
Cd^{2+} 50S,72BH
Pb^{2+} 23B,64SM

Other references: 02NK,03RD,05S,09HS,12S, 43T,52Sd,53NA,59B,59HJ,59R,62ML, 65DB,65K,67KR,72BBa,74GF

H_5IO_6

H_5O_6I Hydrogen periodate (periodic acid) H_5L

Metal ion	Equilibrium	Log K 25°, 0	ΔH 25°, 0	ΔS 25°, 0
H^+	$[H_4L + IO_4]/H_3L.H$	8.29 ±0.04	(2)[r]	(45)
	$H_5L/[H_4L + IO_4]$	1.58 ±0.03		
	IO_4/H_4L	1.45 ±0.02	(11)[s]	(44)
K^+	$MIO_4/M.IO_4$	(0.24)		
	$M.IO_4/MIO_4(s)$	-3.43	15.1	35
Cs^+	$M.IO_4/MIO_4(s)$	-2.65	13.1	32
Cu^{2+}	$M^2.(OH)^3.H_4L/M_2HL(s)$	-42.6		
	$M^5.(OH)^8.(H_4L)^2/M_5L_2(s)$	-110.1		
Cd^{2+}	$M^2.(OH)^3.H_4L/M_2HL(s)$	-42.0		
	$M^5.(OH)^8.(H_4L)^2/M_5L_2(s)$	-109.5		

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[r] 25-45°, 0; [s] 5-45°, 0

Bibliography:

H^+ 54N,65BL,66SV,68KD

K^+ 48M,51CH

Cs^+ 68KD

Cu^{2+} 54N

Cd^{2+} 55Rc

Other references: 03RD,48IN,53SH,60LY,61L, 64LW,69HSc,68MF,69BWa

III. PROTONATION VALUES FOR OTHER LIGANDS

Ligand	Equilibrium	Log K 25°, 0	ΔH 25°, 0	ΔS 25°, 0	Bibliography
Hydrogen niobate*	HL/H.L	13.8[e]			64Nb,
($H_8Nb_6O_{19}$), H_8L	H_2L/HL.H	10.88[e]			other references: 56LPa,60LSV
Hydrogen trithiocarbonate	HL/H.L	8.22[o]	(-3)[r]	(30)	63GKa
(H_2CS_3), H_2L	H_2L/HL.H	2.68[o]			
Hydrogen perthiocarbonate	HL/H.L	7.24	(-10)[r]	(0)	66GW
(H_2CS_4), H_2L					
Hydrogen triselenocarbonate	HL/H.L	7.13	(-10)[r]	(-1)	67GD
(H_2CSe_3), H_2L	H_2L/HL.H	1.16[s]			
Hydrogen germanate	HL/H.L	12.6			26M,29P,31SH,32LM,
($Ge(OH)_4$), H_2L		11.7[c]			63Ia,63IS,64HK,
		12.4[e]			74MB, other
	H_2L/HL.H	9.3			references: 26RS,
		9.02[b] ±0.00			32GM,48C,55La,57A,
		9.02[c]			58KT,60A,62NF,64GZ,
	$H_{13}L_8/(H_2L)^8.(OH)^3$				66AN
		27.8			
		29.3[b] ±0.2			
		30.4[c]			
	H_2L/GeO_2 (s,hexagonal)				
		-1.37 +0.01			
	H_2L/GeO_2 (s,tetragonal)				
		-4.37			
Hydrogen peroxophosphate	HL/H.L	12.8[a]			60FB,65BE
(H_3PO_5), H_3L	H_2L/HL.H	5.5[a]			
	H_3L/H_2L.H	1.1[a]			

[a] 25°, 0.1; [b] 25°, 0.5; [c] 25°, 1.0; [e] 25°, 3.0; [o] 20°, 0; [r] 0-25°, 0; [s] 0°, 0; * metal constants were also reported but are not included in the compilation of stability constants.

III. Protonation Values (continued)

Ligand	Equilibrium	Log K 25°, 0	ΔH 25°, 0	ΔS 25°, 0	Bibliography
Hydrogen thiophosphate	HL/H.L	9.99[i]			69MKb,69PN
(H_3PO_3S), H_3L	H_2L/HL.H	5.83			other reference:
		5.38[a]			65NS
		5.23[b]			
		5.25[i]			
		5.04[c]			
	$H_3L/H_2L.H$	1.52[i]			
Hydrogen tetrathiophosphate	HL/H.L	6.5[i]			69PN
(H_3PS_4), H_3L	H_2L/HL.H	3.4[i]			
	$H_3L/H_2L.H$	1.7[i]			
Hydrogen amidophosphate	HL/H.L	8.63	(-5)[t]	(-20)	61ICa,68LW,69PN
($H_2NPO_3H_2$), H_2L		8.02[i]			
		8.28[c,u]			
	H_2L/HL.H	3.08	(0)[t]	(-10)	
		2.59[i]			
		(3.3)[c,u]			
Hydrogen diamidophosphate	HL/H.L	4.85[i]			69PN
($(NH_2)_2PO_2H$), HL	H_2L/HL.H	1.03[i]			
Hydrogen diamidothiophosphate	HL/H.L	4.2[i]			69PN
($(NH_2)_2PSOH$), HL	H_2L/HL.H	1.9[i]			
Hydrogen fluorophosphate*	HL/H.L	5.12			61RT
(H_2PO_3F), HL		4.72[v]	(2)[w]	(30)	other reference:
		4.47[c]			29L
Hydrogen arsenite	HL/H.L	9.29	-6.6	20	50JW,59AR,61AT,
(arsenous acid)		9.13[a]			64SSW, other
($As(OH)_3$), HL		9.09[b]			references: 13WS,
		9.11[x]			28H,40GH,40IA
	$HL/(As_4O_6)^{0.25}$(s)				
		-0.69			

[a] 25°, 0.1; [b] 25°, 0.5; [c] 25°, 1.0; [i] 20°, 0.5; [t] 0-40°, 0.5; [u] $(CH_3)_4NBr$ used as background electrolyte; [v] 25°, 0.25; [w] 0-65°, 0.25; [x] 25°, 1.5; * metal constants were also reported but are not included in the compilation of stability constants.

III. Protonation Values (continued)

Ligand	Equilibrium	Log K 25°, 0	ΔH 25°, 0	ΔS 25°, 0	Bibliography
Hydrogen arsenate*	HL/H.L	11.50	-4.4	38	53AA,58Mc,59FM,
(arsenic acid)	$H_2L/HL.H$	6.96 ±0.02	-0.8	29	64SSL,64SSW, other
(H_3AsO_4), H_3L		6.39[c]			references: 13WS,
	$H_3L/H_2L.H$	2.24 ±0.06	1.7	16	28H,42TL,56C,56Ca,
					56CS
Hydrogen antimonate	HL/H.L	2.72			63LMa,74MB
(antimonic acid)		2.47[b,u]			
($Sb(OH)_5$), HL	$Sb_{12}(OH)_{64}.H^4/(HL)^{12}$				
		20.34			
		23.06[b,u]			
	$Sb_{12}(OH)_{64}/Sb_{12}(OH)_{65}.H$				
		3.62			
	$Sb_{12}(OH)_{65}/Sb_{12}(OH)_{66}.H$				
		4.83			
	$Sb_{12}(OH)_{66}/Sb_{12}(OH)_{67}.H$				
		5.82			
Hydrogen tetrasulfide	HL/H.L	6.3[h]			60SF
(H_2S_4), H_2L	$H_2L/HL.H$	3.8[h]			
Hydrogen pentasulfide	HL/H.L	5.7[h]			60SF
(H_2S_5), H_2L	$H_2L/HL.H$	3.5[h]			
Hydrogen hydroxylamidosulfate	HL/H.L	1.48[y]			65CW
(hydroxylamine-O-sulfonic acid)					
(H_2NOSO_3H), HL					
Hydrogen peroxosulfate	HL/H.L	9.86[n]			65Ka,
(H_2SO_5), H_2L					other reference:
					63GR

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[b] 25°, 0.5; [c] 25°, 1.0; [h] 20°, 0.1; [n] 19°, 0; [u] $(CH_3)_4NClO_4$ used as background electrolyte; [y] 45°, 1.0; * metal constants were also reported but are not included in the compilation of stability constants.

III. Protonation Values (continued)

Ligand	Equilibrium	Log K 25°, 0	ΔH 25°, 0	ΔS 25°, 0	Bibliography
Hydrogen tellurate* (telluric acid) ($Te(OH)_6$), H_2L	HL/H.L	11.00 ±0.05 10.46[c]	(-9)[r]	(20)	57Aa,59EF,60AT, 62EE,66Bb,71KBa, 72KMB,73KM, other references: 20B,32BR,48F,53La, 53ST,61L,62LYa, 66KC,71BG
	H_2L/HL.H	7.66 ±0.05 7.30[c]	(-7)[r]	(10)	
	H_3L_2.H/$(H_2L)^2$	-6.84 -6.31[c]			
	H_3L_2/H_2L_2.H	7.14[c]			
	H_2L_2/HL_2.H	9.48[c]			
Hydrogen hypochlorite (hypochlorous acid) (HOCl), HL	HL/H.L	7.53 ±0.02	-3.3	23	37P,40H,46AM,57C, 66Ma, other references: 04S, 22NW,24Sa,33BD, 33D,33G,33IM,33RA, 37SB,38SG,40Ha, 42Hb,42S,52Lc, 57MF,58Fa,58FM
Hydrogen chlorite* (chlorous acid) (HOClO), HL	HL/H.L	1.95 ±0.01 1.66[b] 1.61[c]	4.1	23	37P,65LP,68HR other references: 44T,56H,52Lc,54Da, 64GK
Hydrogen hypobromite (hypobromous acid) (HOBr), HL	HL/H.L	8.63 ±0.03	(-7)[r]	(15)	56KT,58AT,64FM, other references: 38SG,39KH,57MF
Hydrogen hypoiodite (hypoiodous acid) (HOI), HL	HL/H.L I/HL.H	10.64 1.54			51BG,58Ca, other references: 22F,25M,42Sa,

[b] 25°, 0.5; [c] 25°, 1.0; [r] 10-60°, 0; * metal constants were also reported but are not included in the compilation of stability constants.

IV. LIGANDS CONSIDERED BUT NOT INCLUDED

Ligand	Bibliography
Hydrogen tantalate ($Ta(OH)_5$)	60LSV,63BLN
Hydrogen octacyanowolframate (IV) ($H_4W(CN)_8$)	71SKa
Hydrogen octacyanowolframate (V) ($H_3W(CN)_8$)	71SKa
Hydrogen manganate (VI) (H_2MnO_4)	24SS,60LYa
Manganate (VII) ion (permanganate ion) (MnO_4^-)	43L,56C,60BC
Hydrogen technetate (VII) (pertechnetic acid) ($HTcO_4$)	53CS,63RH,63SK
Hydrogen pentacarbonylmanganate (-I) ($HMn(CO)_5$)	58HW
Hydrogen tetracarbonylferrate (-II) ($H_2Fe(CO)_4$)	49KS,52HHa
Hexachloroiridate(III) ion ($IrCl_6^{3-}$)	73KT
Hexabromoiridate(III) ion ($IrBr_6^{3-}$)	70KT
Cyanamide ($C(NH)_2$)	54SS
Nitrogen oxide (NO)	24MH,61Tc
Nitramide (NO_2NH_2)	27BKa
Hydrogen α-oxyhyponitrite ($H_2N_2O_3$)	63SRM
Hydrogen pentaphosphate ($H_7P_5O_{16}$)	50VC
Hydrogen hexaphosphate ($H_8P_6O_{19}$)	60IC,61I,61ICa
Hydrogen tetradecaphosphate ($H_{16}P_{14}O_{43}$)	60IC,61I
Hydrogen hexacontaphosphate ($H_{62}P_{60}O_{121}$)	60IC,61I,61ICa
Hydrogen μ-disulfidohexaoxodiphosphate ($H_2O_3PS_2PO_3H_2$)	65NS
Hydrogen fluorotriphosphate ($H_4P_3O_9F$)	65Fb
Hydrogen dithionite ($H_2S_2O_4$)	11J,64LRC,67BC
Hydrogen imidobis(fluorosulfate) ($NH(SO_2F)_2$)	65Ra

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LIGAND FORMULA INDEX

Order of elements: C,H,O,N, others in alphabetical order.

LIGAND NAME INDEX